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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 per year. Single Copy, 35¢. Annual Review Number, $2.00.

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Cable Address. "Ironage" N. Y.

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The IRON AGE

Vol. 159, No. 11 — March 13, 1947

Editorial

Danger, Fission at Work! ... 43

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Technical Articles

Determination of Austenite Grain Size in Cast Steels ... 46
Diamond Powder Increases Polishing Efficiency ... 51
How to Use Carbide Cutters for Milling (Part V) ... 52
200-Ton Door Made of Aluminum Alloy ... 56
High-Temperature High-Strength Porcelains ... 57
Magnesium Research Reports Available to Industry ... 57
A.S.T.E. Convention Preview ... 58
Western Metal Congress ... 60
Basic Openhearth Slags (Part II) ... 64
Production of Alumina From Clay ... 68
New Equipment ... 69

o o o

Features

Newsfront ... 45
Assembly Line ... 76
Washington ... 80
European Letter ... 84
West Coast ... 88
Personals and Obituaries ... 92
Dear Editor ... 96
Industrial News Summary ... 98
News of Industry ... 101
Gallup Polls ... 107
London Economist ... 113

o o o

News and Markets

"Mysterious Strangers" Offer Steel for Sale ... 101
See Record Lake Ore Movement This Year ... 115
Industrial Briefs ... 116
Construction Steel ... 117
Machine Tool Developments ... 118
Nonferrous Market News and Prices ... 120-1
Iron and Steel Scrap News and Prices ... 122-3
Comparison of Prices by Week and Year ... 124
Finished and Semifinished Steel Prices ... 126
Alloy Steel Prices ... 127
Warehouse Steel and Pig Iron Prices ... 129
Ferroalloy Prices ... 130
Record Crowd Expected at Openhearth Meeting ... 134
UAW-CIO Cash Position Down $2 Million ... 136
Bureau of Mines Reports on Sponge Iron ... 141
Favors Guaranteed Wage Through Bargaining ... 142
Coal Blended Seven Times to Make Coke ... 145
To Investigate Metal Flow in a Mold ... 148
CPA Sees Continued Aluminum Shortage ... 149
FTC Asks Screw Price Revision ... 151
New Atomic Lab To Have Staff of 1000 ... 152
Brazilian Ore Study Disappoints M. A. Hanna ... 155

o o o

Index to Advertisers ... 225-26

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The IRON AGE

ESTABLISHED 1855

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March 13, 1947

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Danger, Fission at Work!

CERTAIN Americans who have forgotten their wartime lessons are reviving the old custom of scoffing at the rest of the world. These gentry would have one believe that American science and industry are so progressive that outside competition can be ignored.

Typical of this type of thinking is the new theory that even if Russia has secured the atomic bomb formula she still lacks the know-how to make bombs. Billy Rose, restauranteur, columnist and connoisseur of curvaceous cuties, set forth this wishful thought in a column which, with advertising reprints in other papers, reached several million readers. And aside from the ebullient Billy, other good citizens have convinced themselves that the Russians lack the aptitude to put mechanical science to practical use.

Fortunately these thoughts are not widely held. On the contrary, most Americans now have a fear psychosis about Russia. But such ideas could easily be nourished by careless reasoning or perhaps by deliberate communist efforts. The end result could be a tendency to smug self-complacency, leading to relaxation of American efforts to lead the world in atomic research.

Only 10 years ago the Japanese and their mechanical aspirations were the laughing stock of the world. There was the classic story of the Japanese theft of naval blueprints so cleverly altered that a ship built from them capsized when it put to sea. Her efforts to produce aircraft were similarly ridiculed.

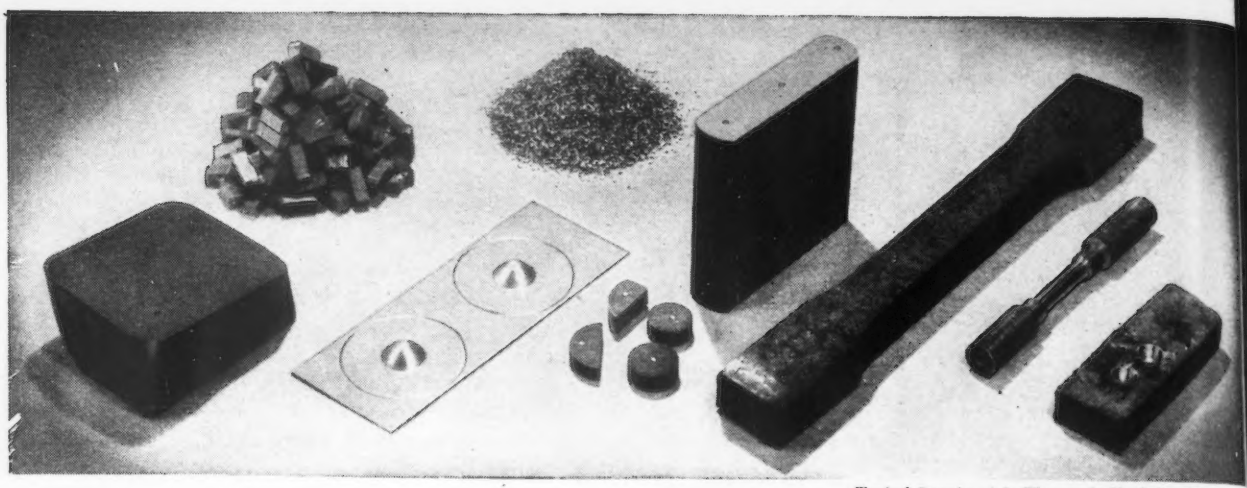
But by 1942 the "stupid" Japanese had launched two 70,000-ton battleships mounting 18-in. guns—each one more than a match for any American capital ship, had it been properly used. And in that year Jap Zeros swept the skies at will—better planes than any single ship America could send against them. Ten years ago, when we were all laughing at the funny little Japanese, these ships and planes were on the drawing boards in Tokio.

No criticism of straight or interpretative reporting of the USSR is here intended. While we see no cause for immediate alarm, such dangerous wishful thinking about Russia should be killed off now in the light of past events.

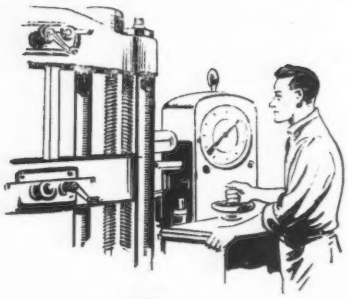
Russia's industry operates secretly under a powerful dictatorship whose mental attitude is that the entire non-communist world is dead set against it. It has tremendous reserves of men, brains and natural resources. To assume in the face of these facts that the United States has any monopoly on the industrial genius is inviting trouble.

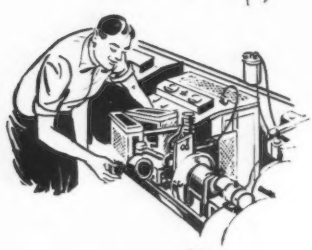
The delusion that we can lightly ignore the Russians because they can't tell borscht from lubricating oil ignores the fact that neutron bombardment means more today to Soviet scientists than does banana oil to most American newspaper readers.

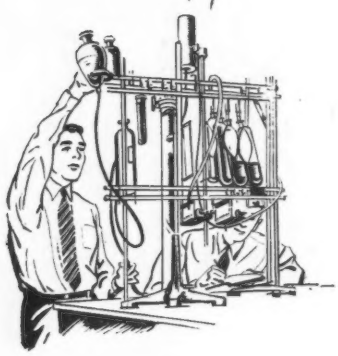
G. F. Sullivan



Typical Samples of the Thousands Checked to Maintain Quality and Uniformity in Inland Steels







Hundreds of Tons of Samples are Tested Yearly

Making steel, the basic material of our modern world, is no simple process — nor is it one of small responsibility. For in making steel thousands of requirements must be satisfied, many involving consideration for human life as well as the reputation of designers, fabricators and builders of equipment. Operations of such consequence call for constant checks and rigid testing — ruling out all guesswork.

In the course of a single year hundreds of tons of steel samples undergo chemical, tensile, metallographic, etch and other tests at Inland. Chemical analyses alone run well over a thousand tons. These precautions are taken to furnish a uniformity and quality in steel that will fully measure up to every requirement.

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► Panel heating, potentially an important market for pipe producers, may soon be the object of a broad research program by a group of independent test engineers. According to preliminary estimates, panel heating pipe requirements may be in the neighborhood of 500,000 tons a year. Panel heating generally requires more pipe than conventional heating installations.

► Here is one reason why so much of the steel being currently offered in the twilight market fails to materialize: As soon as it is discovered that some steel exists (or may exist) and may be up for sale, anywhere from two to seven self-styled salesmen take it on themselves to sell it. The result is that the quantity supposedly available is out of all proportion to what may actually exist as some manufacturer's surplus stock.

► There are indications that a buyer's market may have been reached in certain auto replacement parts such as water pumps. Parts producers have reported cancellations in this product.

► Officials of Jessop Steel Co., anticipating delivery of a 19.5-in. Sendzimir mill sometime early this summer will not have the problem so common in new machinery installations. The company has the auxiliary equipment so that once installed, its operation will not be held up awaiting electrical controls.

► U. S. shipyards have approximately 60 vessels under construction. Throughout the rest of the world there are more than 1000 being built. Labor cost per day to operate a 10,000-ton ship runs about as follows: U. S. $348; British $86; Norwegian $78; Dutch $108; Belgian $76; and Greek $68. The U. S. figure is about twice what it was in 1940 and four times the 1934 figure.

► Some makers of rear-view mirror shells have switched from steel to brass. Brass is also being substituted for steel in some cylinder block gaskets. Brass has also been used in place of electrolytic copper due to the critically short supply of copper.

► As protection against dangerous radiations, the front portion of the new cyclatron at the University of Pittsburgh is guarded by a 4-ft wall of water encased in steel. Entrance is gained through a 4-ft thick, water-filled door, moved on wheels by electric power.

► At the present rate this summer will probably see the worst freight car shortage in the nation's history. It would take over 100,000 cars to supply this summer's shortage.

► Some American manufacturers are despairing of building up the foreign trade they lost before the war. Distress abroad coupled with almost insuperable exchange regulations are prime reasons. Some hope the Geneva trade meeting will clear things up but are not too optimistic. Even traditional traders like the Belgians and the Dutch are having trouble getting along these days.

► In the 12 years from 1934 to 1946 the Federal Government, says Sen. Harry F. Byrd, watchdog of the treasury, has paid out $43 billion in subsidies.

► Metalworking and metal products plants borrowed more money from the banks since VJ-Day than any single industry. The size, nature and unbalance of metal-working inventories are among the main reasons.

► What contacts the Steel Corp. and the steel union are to have this week on wage negotiations will still be tempered by waiting for action on the portal to portal question. There will be definite talk but it will lead nowhere until both sides see their way clear to a final agreement unaffected by portal uncertainties. Meanwhile time is passing.

► Elgiloy, a non-magnetic alloy developed for mainsprings after 12 years of research by Elgin Watch Co. engineers, has been revealed as opening new fields in the manufacture of razor blades, stainless cutlery, jet propulsion, gas turbine and valve parts. Containing Co, Cr, Ni, Mo, Mn, Fe, C and Be, it is said to be 100 pct rust resistant, resists all ordinary chemicals, including hot aqua regia, and possesses unusual physical qualities.

► New all-crystalline porcelains with exceptional mechanical and dielectric strengths at temperatures up to 2000° F are expected to be especially useful for electrical insulators which run at high temperatures, as well as for aircraft spark plugs and radar transformers.

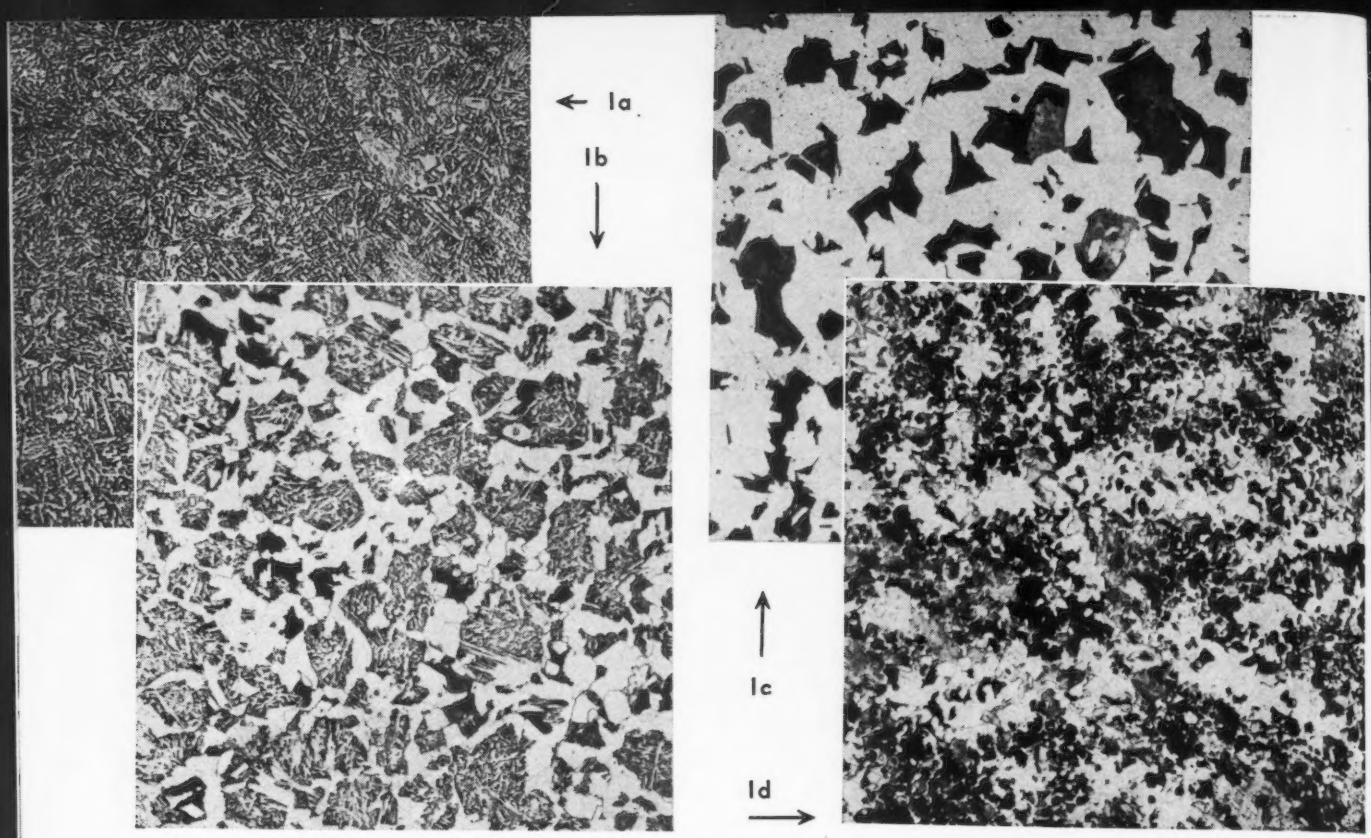


FIG. 1—Variation in cooling rate changes type of structure in cast steels cooled from 1550°F: (a) alloy cast steel, air cooled; (b) same steel, cooled more slowly; (c) same steel, furnace cooled; (d) similar steel, furnace cooled. Nital etch, 100X.

Determination of
Austenite Grain Size

In spite of the growing demand for controlled grain size in many cast-steel foundry products, no generally accepted method for rating grain size is available. The author presents herein a description and evaluation of a number of methods for rating grain size, including fracture, oxidation, normalizing, gradient quench, martensitic etch and the McQuaid-Ehn methods. A discussion of general characteristics of grain size in cast steels is also included.

EVERY metallurgist knows the important influence exerted by austenite grain size over the quality of steel products. Such properties as toughness, hardenability, machinability, and creep strength are affected to such an extent that grain size specifications may be imposed because of any one of them. Such has customarily been the case for many years in the field of automotive steels and tool steels, and as a result, several well-known methods for determining and reporting grain size are standardized and in regular use for routine quality control.

Until recently, much less importance has been attached to the subject in the field of cast steels, and no generally accepted methods for rating grain size are available. A contributing factor to this disinterest is undoubtedly the fact that, in contrast to wrought steels, various types of cast steels heat treated in various ways exhibit a rather bewildering array of microstructures. Reasons for and control over these microstructures are imperfectly understood, and some of them make grain size determinations on a cast steel impossible by the usual techniques.

The demand for controlled grain size in many steel foundry products, such as pressure fitting castings, is increasing rapidly today, so it is of interest to consider the possible techniques of measurement and the general characteristics of grain size in cast steels.

In the first place, it should always be remembered that, except in the case of low carbon sheet steels, the grain size of a steel means previous austenite grain size; that is, it refers to grains in a microstructure which existed the last time the steel was at a temperature above about 1330°F, but which has since transformed to another microstructure on cooling to room temperature where the measurements are made. Thus, in an as-cast steel, the grain size refers to the very coarse austenite grains formed just below the freezing point of the casting. Most steel castings are normalized or given some form of heat treatment, however, so we are much more often interested in the size of the new and much finer austenite grains which form on reheating to the relatively low temperatures employed.

Most of the discussion that follows is concerned

with this grain size and the applicability and merits of various methods by which it can be determined. The observations presented result from experience gained in the study of a wide variety of carbon and alloy cast steels during research projects sponsored by the Steel Founders' Society of America in the author's laboratory at Carnegie Institute of Technology.

Description and evaluation of several test methods are taken up individually in the following sections. It is useful to note, however, that all of them can be performed simultaneously on the same test specimen, thus allowing a check upon accuracy. The specimen dimensions should be about 2½ x ⅜ x ⅜ in.; after heating at the temperature and time to be investigated, one end is cooled rapidly by quenching in water while the other end is very slowly cooled by being held in thick tongs previously heated to the temperature of the test (it must be remembered that the size of austenite grains in a given sample of steel is determined by the temperature and time to which they are heated and has nothing to do with the cooling rate which follows). After the specimen has cooled to room temperature, the size of the austenite grains developed at temperature can be studied by any of the following methods.

The fracture method has wide application in the field of high carbon tool steels. After a sample is heated at the desired temperature, it requires merely that the sample be quenched rapidly enough to form

in Cast Steels

By M. F. HAWKES

Asst. Professor, Dept. of Metallurgical Engineering, Carnegie Institute of Technology, Pittsburgh.

brittle martensite, then be fractured and compared visually with a set of fracture standards. Little information exists on the applicability of the test to the general run of medium carbon cast steels, and studies made by the author do not indicate great promise.

Roughly half the fracture ratings made could not be confirmed by microscopic methods; various reasons account for this. Most cast steels are of considerably lower carbon content than tool steels and many of them, especially the alloy grades, bend before breaking even though they are martensitic. The plastic deformation of bending alters the appearance of the fractured surface. Other specimens break in a brittle fashion but still exhibit fractures which do not have the appearance of the standards; instead, they have a dull somewhat "fibrous" surface. This is thought to be the transgranular fracture recently investigated by Grossmann.[1]

[1] *M. Grossmann, Metals Technology, vol. 13, T.P. 2020, April 1946.*

Since no conditions for reliability of the test can be stated, it is best to disregard fracture grain size results on cast steels unless the samples show a brittle fracture with exactly the same appearance as the fracture standards.

Oxidation Method

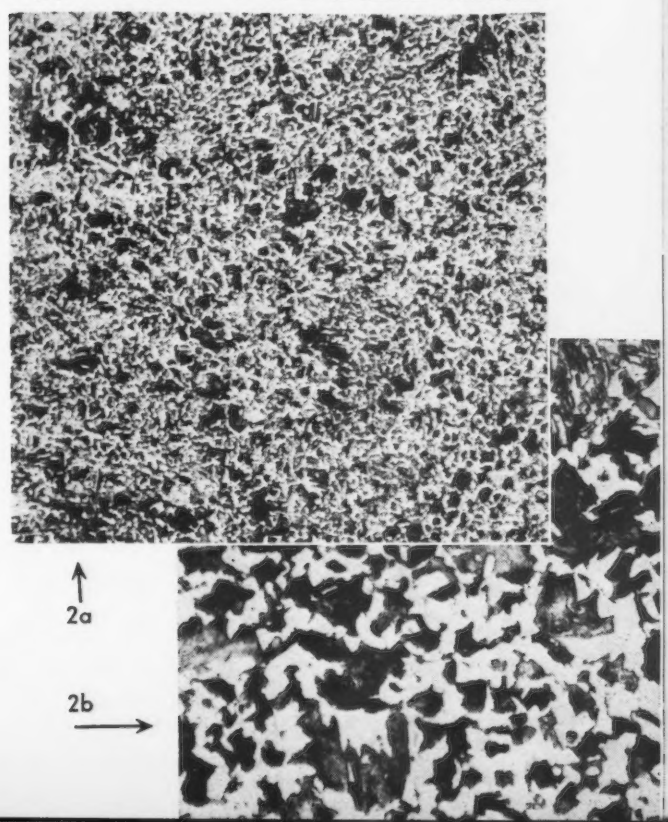
In contrast with the fracture test, the oxidation method and those to follow require the use of a microscope. They all consist of treatments to produce a structure which will delineate the position of former austenite grains coupled with etching procedures which will make those structures apparent when photographed at 100X for comparison with the ASTM standards.

The "oxidation" method[2, 3, 4] actually makes use of grain boundary decarburization at the testing temperature, followed by quenching to form martensite with ferrite grain outlines which are etched black in a special alcoholic-HCl solution. Results on cast steels with this test are likewise not encouraging, for about half the time these surface grain size ratings are from one to two ASTM grain size numbers finer than ratings made throughout the specimen by the other more reliable microscopic methods. Thus, the oxidation method probably should be used only when no other indication of grain size can be obtained and where it is sufficient to distinguish between coarse and fine grained steel without obtaining an accurate numerical rating.

[2] *Tobin and Kenyon, Trans. ASM, vol. 26, 1938, p. 133.*
[3] *Austin and Day, Trans. ASM, vol. 28, 1940, p. 354.*
[4] *Miller and Day, Trans. ASM, vol. 30, 1942, p. 541.*

The normalizing method makes use of the fact that hypoeutectoid steels frequently transform on relatively slow cooling to pearlite, plus ferrite which has outlined former austenite grain boundaries; thus the

FIG. 2—Deceiving structure in normalized cast steel: (a) at 100X, ferrite appears to outline grain boundaries; (b) at 500X, ferrite is seen to be random. Nital etch.



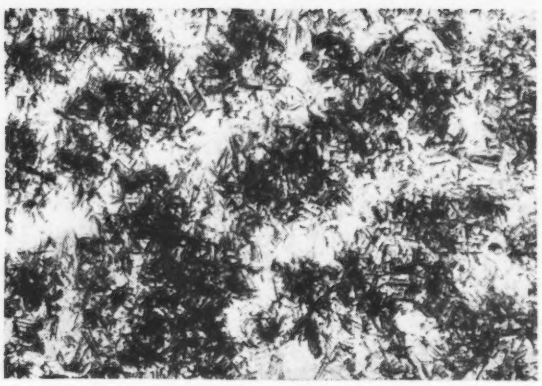


FIG. 3—Bainite formation and dendritic segregation cause failure of gradient quench method in alloy cast steel. Nital etch, 100X.

grain size of a normalized or annealed steel may often be determined merely by rating a microsection given an ordinary nital etch. Faster cooling rates are needed for lower carbon steels to avoid excessive amounts of ferrite, and very slow cooling rates are needed for higher carbon steels in order to obtain complete outlining. A wide variety of cooling rates can be obtained in the specimen described at the outset: this avoids the necessity of treating several specimens to determine the right rate.

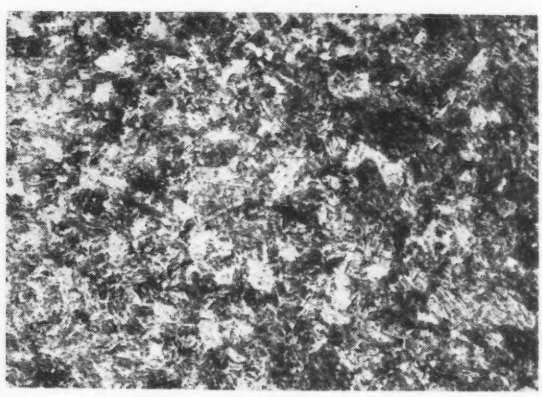
This method gives the true austenite grain size when ferrite outlining does occur, but there are several reasons why this does not happen in many cast steels. Most prominent is the fact that, especially in alloy cast steels, there is a very pronounced tendency for ferrite to precipitate in a fine, plate-like geometric pattern rather than in a grain boundary network. This Widmanstatten pattern becomes more pronounced as the cooling rate during normalizing is increased until at fast enough rates it is superseded by martensite. On cooling at slower rates, such as in annealing, however, an excessive amount of ferrite is formed, and it is usually distributed at random or according to a dendritic-segregate pattern rather than in grain boundaries. A typical progression of structures in an alloy cast steel, ranging from a Widmanstatten pattern formed at a relatively fast cool to a random pattern formed at relatively slow cool, is shown in fig. 1a, -b, and -c. In other steels the slow cool often produces a segregated pattern as illustrated in fig. 1d.

In none of the structures of such a series does ferrite outline former austenite grains. Structures similar to that of fig. 1b are easily confused with true grain boundary outlines but are merely a result of the fact that the transition from Widmanstatten to random ferrite, on decreasing the cooling rate, does not occur uniformly throughout a cast steel. Instead, certain areas, again distributed according to the pattern of dendritic segregation, make the transition at faster cooling rates than others. Thus at cooling rates within a certain range, structures similar to that in fig. 1b are obtained; they can be distinguished from structures with true grain boundary outlining by virtue of the fact that they have a matrix of fine Widmanstatten ferrite plus pearlite rather than pearlite alone. Structures showing mixed patterns should not be used for grain size determinations.

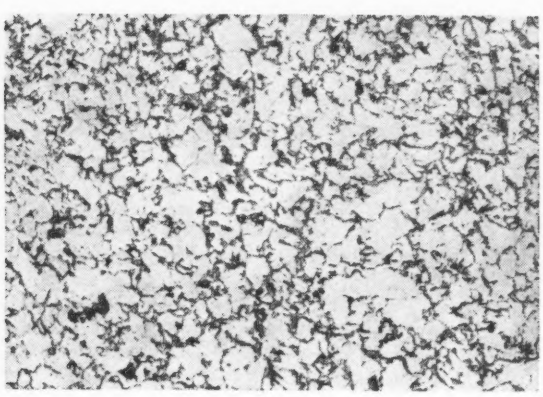
Fig. 2a illustrates another common structure which can be very deceiving. At 100X this specimen appears to exhibit a very fine ferrite outline around former austenite grains. At 500X, however, the ferrite is shown to be random.

Many tests using the normalizing method lead to the conclusion that it usually fails to delineate austenite grain size in alloy cast steels, and though it frequently works on plain carbon steels, some familiarity with cast steel structures in general is necessary to avoid confusion.

FIG. 4—Two methods used to delineate grain size in 0.30 pct C cast steel heated 1 hr at 1550°F; (a) Martensitic etch method, Picral-HCl etch, 100X; (b) gradient quench method, Nital etch, 100X.



4a



4b

Gradient Quench Method

The gradient quench method makes use of the fact that many steels, when cooled at rates just slower than the critical cooling velocity, transform to a structure consisting of a few nodules of dark-etching, fine pearlite nucleated at austenite grain boundaries in a matrix of light-etching martensite. At some position along the length of a specimen gradient quenched to produce a range of cooling rates, there is just the right amount of this fine pearlite to outline completely the former austenite grains.

This method is successful much of the time on plain carbon steels but usually fails on alloy cast steels. Two reasons, both illustrated in fig. 3, account for the trouble. In the first place, many alloy steels transform to bainite or other intermediate products instead of to pearlite at the necessary cooling rate. These products are usually distributed to a great extent randomly rather than primarily at austenite grain boundaries. In the second place, dendritic segregation of alloying elements causes the amount of nodular fine pearlite to vary widely over the specimen. Thus, areas of com-

plete transformation coexist with areas of no transformation and neither are suitable for rating grain size.

Martensitic Etch Method

In view of the foregoing, it is apparent that when dealing with cast steels we are faced with the probable failure of most common methods for determining austenite grain size. Fortunately, there is one very suitable method left. This is the martensitic etch method originally developed by Vilella[5] for determining the previous austenite grain size of steels which had subsequently been quenched and tempered.

[5] *J. Vilella, "Metallographic Technique for Steel," 1938, p. 38.*

As with the other tests, a specimen is heated at the temperature and time to be investigated; it is then rapidly quenched to form 100 pct martensite. A microsection is then carefully polished and etched in a solution containing 1 g of picric acid and 5 cc of concentrated HCl in ethyl alcohol. This etchant uniformly darkens the martensite formed from any one former austenite grain, but it darkens different grains to a different degree, thus producing a grain contrast rather than a grain outlining etch. This contrast is more distinct if the martensite is tempered at about 600°F for ½ hr before polishing and etching.

The martensitic etch test has proved successful most of the time in determining the austenite grain size of a wide variety of carbon and alloy cast steels heated to various temperatures. It is much less affected by dendritic segregation than the other methods and commonly is the only method which will work on the alloy steels. It is just as successful on the simpler steels where other methods do work, and thus there is ample opportunity to determine whether correct results are obtained. That this is the case is illustrated in fig. 4a and b, for a very fine grained steel which is the more difficult type to rate by the martensitic etch method.

The outstanding feature of the method, however, is its ability to delineate the grain size when no other method works. Figs. 5 and 6, for coarse and fine grained samples, respectively, are examples of steels where this is the case.

Since the method produces no grain boundary constituent, it is possible only in high contrast photomicrographs of coarse grained samples to locate exactly the entire boundary of every grain. Nevertheless, the aggregate of contrasting grains is readily rated for size by comparison with similar standards (see ASM *Metals Handbook*). This lack of grain outlining does not place the martensitic etch method at an inherent disadvantage with respect to the other microscopic methods, for they too suffer from difficulties inherent in the mechanism for delineating grains; in particular, grain boundary precipitates tend to obliterate the boundaries of very small grains before all the largest grains are completely outlined.

From time to time, steels are encountered which do not respond properly even to the martensitic etch. This is usually because of pronounced dendritic segregation of such a nature that the etch is much more sensitive to the composition differences in the martensite than to the orientation differences. This is shown in fig. 7. As is also illustrated in this figure, an observer unaware of the effect might mistake some of these segregate patterns for true grain contrast. Trouble is not often encountered for these reasons, however, because

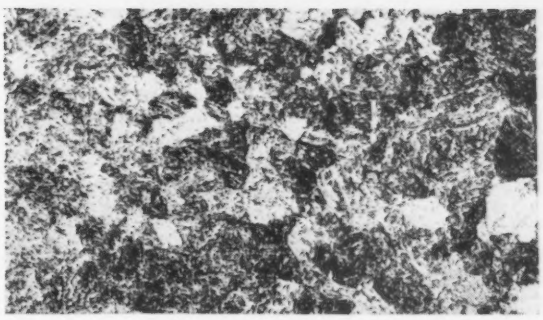


FIG. 5—Martensitic etch method used to reveal grain size in silicon-killed alloy cast steel (0.40 pct C), heated 1 hr at 1700°F. Picral-HCl etch, 100X.

dendritic segregation seldom influences the test seriously. Figs. 5 and 6 serve to illustrate this, for they were from samples which could not be reated by normalizing or the gradient quench because of segregation.

Thus, it may be stated with confidence that the martensitic etch test is well suited for routine grain size determinations on carbon and alloy cast steels over the entire range of grain sizes developed in ordinary heat

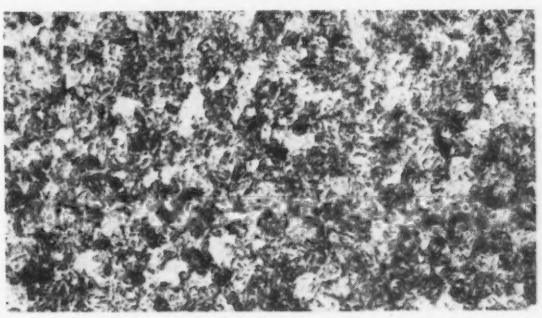


FIG. 6—Martensitic etch method used to reveal grain size in titanium-treated alloy cast steel (0.30 pct C), heated 1 hr at 1550°F. Picral-HCl etch, 100X.

treating. It is simple, reliable, and the most suitable test for general work on steel castings.

McQuaid-Ehn Test

For steels to be carburized, the McQuaid-Ehn test is an important method for determining grain size. It is not included in this discussion, however, because the general run of cast steels are not carburized and are not heat treated for long times at high temperatures as required by the test. Experience on many cast steels where this test was compared with the ones previously

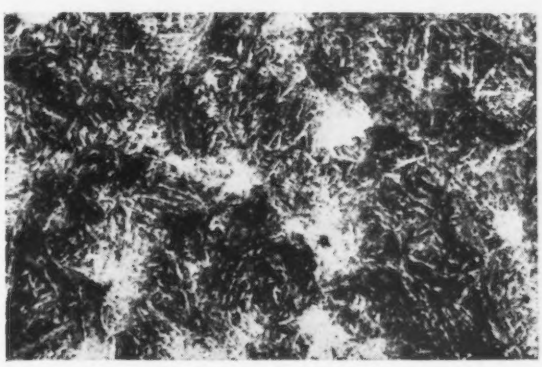


FIG. 7—Dendritic segregation in alloy cast steel causes failure of martensitic etch method. Picral-HCl etch, 100X.

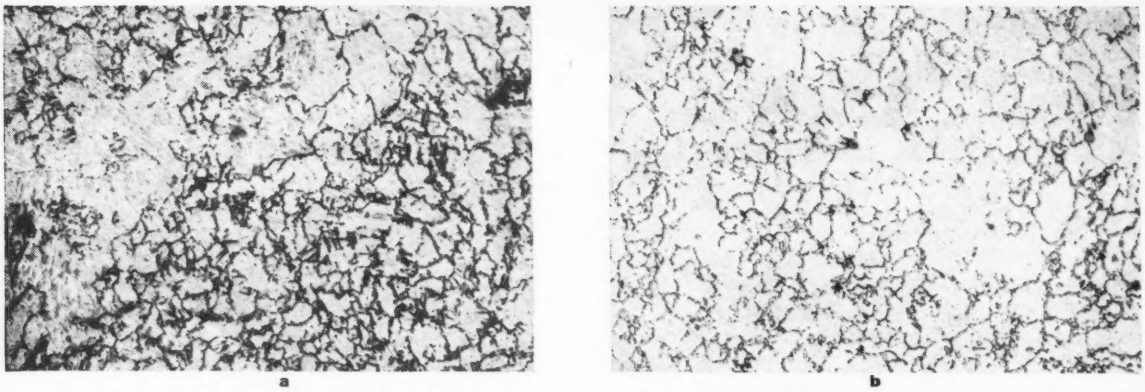


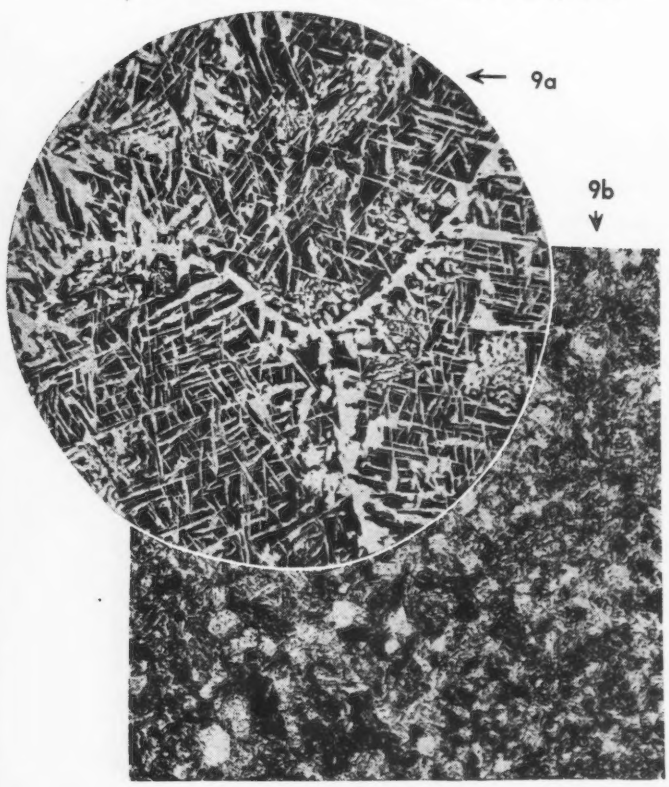
FIG. 8—Deoxidation with aluminum restricts grain growth in medium carbon manganese cast steel: (a) heated 1 hr at 1550°F, gradient quenched; (b) heated 6 hr at 1700°F, gradient quenched. Nital etch, 200X.

discussed using similar temperatures and times indicates that in general the correct grain size is obtained. Occasionally, however, steels are found in which the grain size in the carburized case is greater than that in the core.

Grain Size Characteristics

The grain size test methods discussed afford means of ascertaining the austenite grain size that will be developed by any of the common heat treatments applied to steel castings. Results on a wide variety of cast steels indicate that, in general, their characteristics are quite similar to those of comparable wrought steels. Thus, with proper aluminum deoxidation, cast steels will be as resistant to grain coarsening as wrought steels. This is illustrated in figs. 8a and b which show an aluminum-killed cast steel that is only slightly coarser after 6 hr at 1700°F than it is after 1 hr at 1550°F; 1700°F is a considerably higher temperature than would ordinarily be used in the heat treatment of this steel, yet it remained so fine that a magnification of 200X was necessary to outline its grains properly.

FIG. 9—Reheating refines grain size of silicon-killed cast steel (0.30 pct C): (a) as-cast, Nital etch, 25X; (b) heated 1 hr at 1550°F; Martensitic etch method. Picral-HCl etch, 100X.



Similar results can be obtained with silicon-killed cast steels to which titanium or other special additions have been made. Furthermore, many straight silicon-killed cast steels without further additions are fine grained at 1550°F, which is frequently high enough for the final heat treatment applied to them. Many such steels will have an ASTM grain size rating of 6 to 8 at this temperature. Comparable silicon-killed wrought steels would not ordinarily be expected to be so fine. This is probably because much larger silicon additions are used in the cast steels.

On the other hand, many silicon-killed cast steels are not fine grained; considerable variability exists from heat to heat probably because of differences in the details of deoxidation practice. Most silicon-killed cast steels exhibit more of a range of grain sizes than do aluminum-killed steels (this exists at all temperatures and is not the duplex grain size formed in aluminum-killed steels heated just into the coarsening range).

Finer grained steels appear to show a smaller range of grain sizes (i.e. No. 7 to 8 instead of No. 3 to 6) than do the coarser steels; however, it is debatable whether this is always a true effect or is often merely the result of the finest grains in the fine grained steels being obliterated as a result of the method used to delineate the grains. This range of grain sizes is not characteristic of cast steels alone; it is also observed in wrought steels but does not attract much attention because most of the grain size tests on wrought steels are made on "automotive" or tool steels which are aluminum killed and fine grained. On the other hand, many alloy cast steels are silicon killed. Even the aluminum-killed steels, however, are usually rated by at least a pair of ASTM grain size number (i.e. No. 7 to 8), and it would seem that, for most industrial work (except with tool steels), the ASTM grain size scale would be less bothersome and just as useful if it contained only the odd or the even numbers.

As-Cast Grain Size

Austenite grains form at or slightly below the freezing point of a cast steel. The temperature is high and the time at temperature is appreciable, so these grains are ten times or more the size of the grains formed on subsequent heat treatment. Even though most steel castings are reheated at least once, it is often of interest to know the as-cast grain size. Its determination poses a problem, however, for none of the tests pre-

viously discussed are applicable; they all involve reheating. Instead, evidence of the position of the as-cast austenite grains must be obtained from the room temperature microstructure to which the austenite transformed on cooling through the critical range. If the structure were martensite, the martensitic etching solution could be used, but cooling rates and hardenabilities are usually too low for this to be the case.

Dendritic or Widmanstatten patterns of ferrite and pearlite usually predominate in the as-cast structure, but occasionally sufficient grain boundary outlining by ferrite exists for a rating. Examination of such steels discloses very coarse as-cast grains as illustrated in fig. 9a; a single reheating, however, has always been found sufficient to form a new set of austenite grains of a size comparable to similar wrought steels. Furthermore, although more data are needed on this subject, no correlation has been found between the as-cast grain size of a steel and its grain size after reheating. The silicon-killed steel of fig. 9a, for instance, was one of the coarsest of a series of steels examined in the as-cast state; yet after reheating at 1550°F it is seen in fig. 9b to be fine grained.

Conclusion

Although it has been the object of little study, the subject of austenite grain size in steel castings is similar in most respects to the analogous subject so familiar to metallurgists in the automotive field. Cast steels have a very large grain size in the as-cast state, but this is of little importance, for a single reheating produces a fine grain size similar to that found in wrought steels. Resistance to grain growth at high temperatures is readily conferred by aluminum deoxidation, and even silicon-killed cast steels can be made fine grained at the proper temperature for heat treatment. Frequently the common methods for determining grain size fail with cast steels, but the martensitic etch method will get results nearly every time. In short, the subject of austenite grain size should involve no more apprehension for producers and users of steel castings than it does in the wrought steel industry.

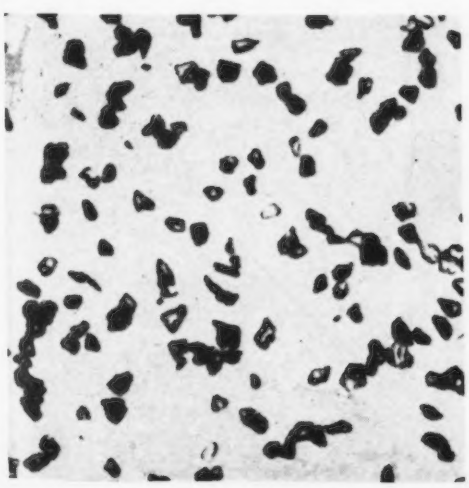
Diamond Powder Increases Polishing Efficiency

SIZE uniformity and greater efficiency in cutting and polishing are outstanding characteristics of a diamond powder, crushed and graded by the Sapphire Products Div., Elgin National Watch Co. As indicated in fig. 1, the Elgin-processed powder is said to contain fewer fines, oversized flakes have been eliminated, and a closer range of particle sizes is apparent. This photomicrograph can be compared with fig. 2, which represents a typical Bureau of Standards rating.

The advantages claimed for the Elgin-processed diamond powder include (1) more uniform cutting and polishing action, and (2) the elimination of gouging that is caused by oversized particles and flakes. Reduction in the number of fines (fines referred to are particles sized below the minimum specified for a particular grade) results in a greater proportion of "working" powder for the user.

The gun type applicator, fig. 3, protects the diamond powder from contamination and also meters the quantities of diamonds used. The contamination protection feature is important in view of the impurities and dust present in a room devoted to grinding operations, as well as the grit transferred from an operator's hands. Also, the gun type applicator is claimed to permit the diamonds to be held in a state of constant suspension—previous methods have been unable to prevent the diamonds from settling in cakes.

FIG. 3—Gun type applicator protects powder from contamination.

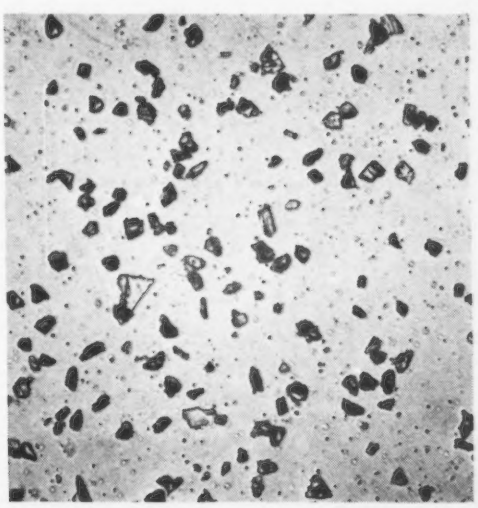


LEFT

FIG. 1—Photomicrograph, made by Armour Research Foundation, of a typical Elgin-processed diamond powder. 400X.

RIGHT

FIG. 2—Photomicrograph of a diamond powder representing a typical Bureau of Standards rating. 400X.



How to Use Carbide Cutters

By H. A. FROMMELT
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THE accepted definition for alloy steels, that is, steels formed by the addition of one or more elements to carbon steel, is used in this article. Stainless steels are set apart for reasons of emphasis only. In addition, the latter present unusual machining problems not usually associated with alloy steels.

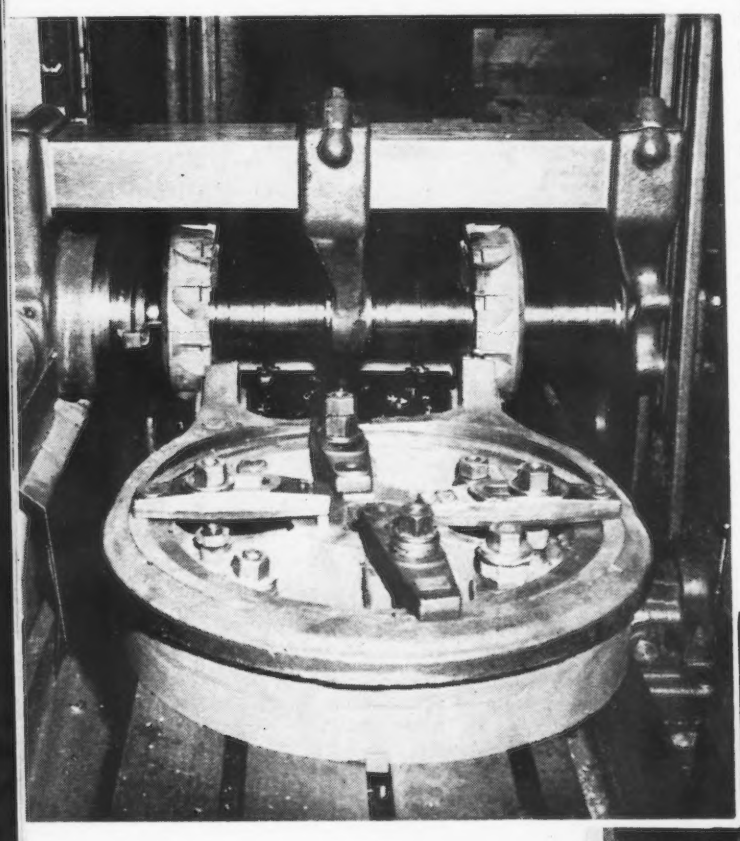
In a previous article, the carbide milling of high Brinell steels was discussed at length. Examples, for that purpose, were chosen from among heat-treated alloy steels. This will again be the rule in this discussion where the milling of alloy steels is being considered. The difference, however, lies in the emphasis of the effect of hardness due to heat treatment on machinability. Here, the emphasis will be placed largely on the effect of the inherent nature of the alloy material itself upon machinability. The discussion, moreover, will embrace both heat-treated and untreated alloy steels.

The machinability of alloy steels, whether treated or untreated, varies with the nature of the alloy. Some present problems of machining due to the tendency to build up; others because of their tendency to work harden; and still others simply because they have an unusually disadvantageous effect upon the carbide itself, the exact nature of which may as yet not be clearly understood.

A tank turret ring, specified as constructed of armor plate, is shown in figs. 32 and 33. The fixture for holding this workpiece can be fully appreciated from an examination of fig. 32. It is mounted on the table of a bed-type machine (Sundstrand Rigid Mill) with 25 hp capacity and a heavy duty head.

The established relationship between the two half side mills and the workpiece makes possible the milling of the hinge ends on this component as shown. The use of an arbor support between the two half side mills, with the second at the end of the arbor, and the addition of an outboard arbor support represent good practice. This armor plate specification presents a somewhat difficult problem from the standpoint of carbide milling. The tendency of this material to work harden is well known and presents the major problem to be overcome.

Two 10-in. diam, ten-tooth universal face mills hav-



ABOVE

FIG. 32—Milling the hinges of a tank turret ring made from cast armor plate. The use of arbor supports at the center and end of the arbor, and the addition of an outboard support represent good carbide milling practice.

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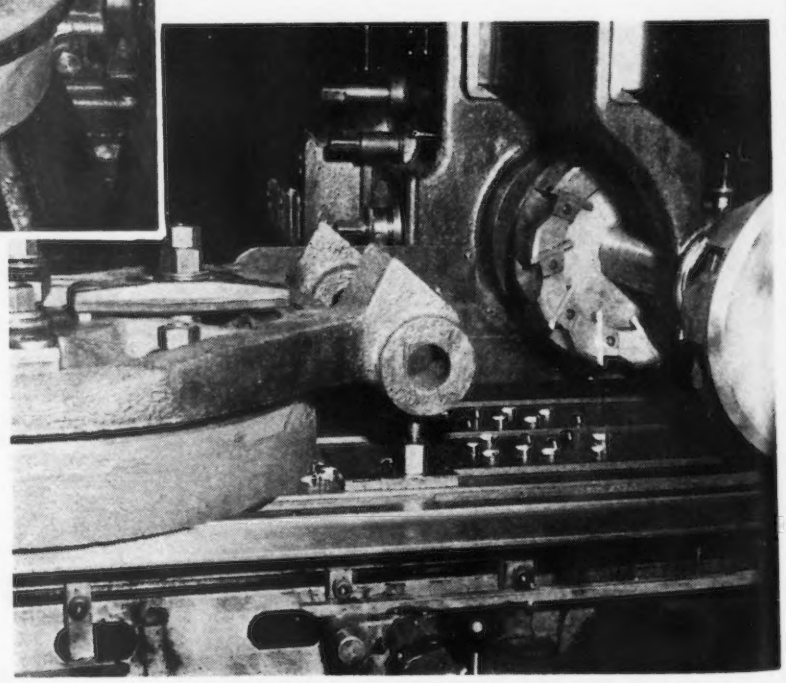


RIGHT

FIG. 33—Close-up of the workpiece shown in fig. 32. The cored hole for the hinge pin results in an interrupted milling cut, but in spite of this the rate of metal removal is 13½ cu in. per min.

for Milling

Armor Plate

Heat-Treated Alloy Steel

Stress Proof Steel

Die Plates

Milling of alloy steels with carbide cutters is discussed herein with particular reference to those materials usually considered difficult to machine, including armor plate, heat-treated SAE 4340, SAE X1020, stress-proof steel and die plates. In each case examples are taken from actual shop practice. Feeds, speeds and cutter angles are given, and the reasons for their selection are explained.

ing carbide blades are used in the form of two half side mills as shown. The cutting angles are 7° negative radial rake and 7° negative axial rake with which is incorporated a 15° corner angle. A 7° clearance angle is ground into the OD of each blade and also a 7° clearance angle is specified for the cutting face of each blade. The dish angle is 0° and, in this technique, makes possible superior finishes.

It is well to consider for a moment the importance of proper clearance angles for all material such as armor plate. Unless a 7° face clearance angle is specified, this milling operation will be a complete failure. In addition the clearance angle on the OD may also be considered as critical. Unless these clearance angles are specified, it is impossible properly to mill armor plate such as this tank turret ring.

The surface foot rate chosen is 550 which, with 10-in. diam cutters, results in a spindle speed of 210 rpm. This choice of surface foot rate, is significant. The table of surface foot rates (spindle speeds) and Brinell hardness numbers calls for a considerably lower rate with a hardness of 285 Brinell which is specified for this component. Nevertheless, it is necessary to use a surface foot rate of over 500 in order to overcome the effect of work hardened chips on the carbide blades. This was determined experimentally. It was also evident from trial runs that a chip load of 0.008 in. per tooth gave entirely satisfactory results. With a spindle speed of 210 rpm this results in a feed rate of 17 ipm.

The area of the cut is approximately 4 x 4 in. The depth of the cut is 0.200 in. It should be underlined here that, in addition, this is an interrupted cut due to the cored openings cast into the hinge ends, as can be seen in fig. 33.

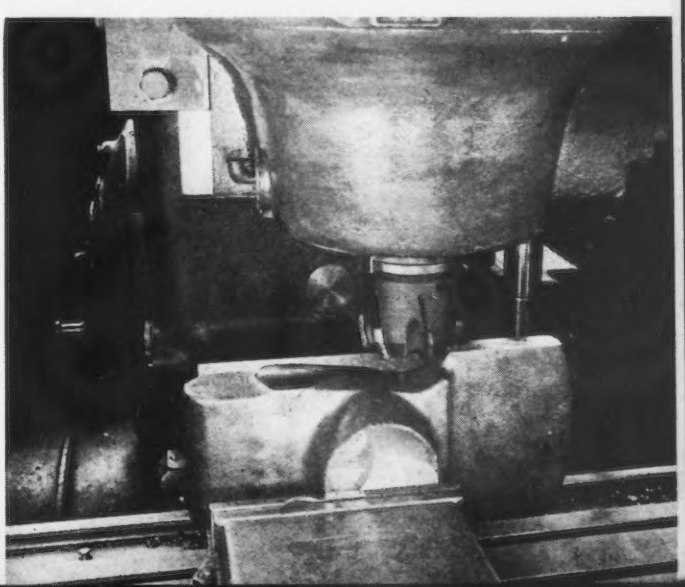
It is significant that the metal removal rate is 13.6 cu in. per min. Under these conditions 10.8 hp is used, and hence the horsepower per cu in. per min is approximately 0.7, an unusually low K-factor for cast armor plate with a hardness of 285 Bhn.

By comparison, the figures for high speed steel operation on this component are interesting: The feed rate used with the best available high speed steel cutters was ⅜ ipm. The surface foot rate was 30. These operating characteristics compare with a 17 in. feed rate and a surface foot rate of 550 for the tungsten titanium carbide blades. Moreover, with carbide the number of pieces between grinds is more than trebled.

The milling technique results in an interesting reduction in the setup time for this operation. Once the half side mills are properly spaced on the arbor according to the dimensional relationship specifications, they are not disturbed during the length of the entire run. The blades, when dulled, are removed and ground in a grinding block or jig much as a single point tool is ground. A reconditioned set of blades is assembled in the two cutter bodies which, in effect, are precision tool holders. Slot, blade and wedge tolerances are such that it is possible to assemble the reconditioned blades in the bodies, their position on the arbor having been left undisturbed. Obviously, this development reduces the down time of the machine from several hours to approximately 20 min. This is a significant and gratifying result of application of carbide milling to a straddle or half side milling operation.

Fig. 34 presents the milling operation as performed

FIG. 34—In milling this aircraft crankshaft part of SAE 4340 steel heat treated to 270 Bhn, a spindle speed of 475 rpm is used with a 4-in. cutter and a feed of 27 ipm. Stock is removed at the rate of 8 cu in. per min.



on an aircraft engine part using cutters which incorporate solid carbide blades mechanically held in position. This milling operation is performed on an SAE4340 material heat treated to approximately 270 Bhn. Tolerance and surface finish specifications are rigid, as is typical of aircraft engine parts.

The milling operation performed on this counterweight is done on a vertical knee-type milling machine, with a flywheel attached to the vertical spindle and therefore specially engineered for carbide steel milling. This feature of milling machine design specially suited and adapted for carbide milling assures a smooth, uniform flow of power to the cutter. The 4-in. diam cutter used for this operation has six carbide blades 5/16x9/16x1½ in. long. These blades are mechanically held in position by means of a wedge and an Allen screw.

The surface foot rate selected, keeping in mind a component heat treated to 270 Bhn is, as table III specifies, 500 surface feet. This, with a 4-in. cutter, results in spindle speed of 475 rpm.

Following good carbide milling practice, a chip load of 0.010 in. per tooth is specified and this with six teeth results in a feed of 0.060 ipr. Hence, a table feed of 27 in. per min is called for. The depth of cut is approximately 0.150 in. and 8.1 cu in. per min. The horsepower input to the spindle is 5 and hence the K-factor is 0.65 approximately. The horsepower per cu in. per min rate is noteworthy for SAE 4340 material that has been heat treated to 270 Bhn. The finish is far superior to that obtainable with high speed steel and the cutter life is approximately five times that of high speed steel.

No particular difficulties are encountered in the milling of this alloy material. Due to the Brinell of 270, the cutter life is reduced somewhat as compared with the customary 160 Brinell reading for untreated straight carbon steel. However, no special precautions or change in technique, including grinding (clearance angles particularly) need be observed.

Milling X1020

The material specification X1020 was quite commonly used during the war and caused no end of machining difficulties. While it appears to be a close relation to SAE 1020, whose machinability is indeed most gratifying, the X1020 specification presents ruinous possibilities to the unwary and the beginner.

The chief characteristic of SAE X1020 material that results in a decided lowering of its machinability is its sticky and stringy nature. The chips tend to ball-up, to take a free ride, and to resist every effort at proper ejection and elimination. These pellets quickly heat to the welding point or at least to the sticking point and therefore cling tenaciously to the cutter body and the braze.

A typical example of machining this material is the case of a 2¼-in. wide block milled on a 7½ hp No. 3 Cincinnati mill. Used on this job was a 6-in. diam cutter equipped with carbide blades of the following cutting and clearance angles: 7° negative radial rake, 7° negative axial rake with which is incorporated a 15° corner angle. The OD relief angle is 7°, the face relief angle is 7° and the dish angle is 0°.

Since the block is 2¼ in. wide and the cutter tooth pitch 3⅛ in., only one blade is in cutting contact at any one instant. Hence, the resulting impact blows are equivalent to those produced by a fly cut, a condition far from ideal. In spite of these difficulties, satisfactory results were obtained on all of the three runs made with the 6-in. diam face mill operating at 357 rpm, which corresponds to 550 sfm.

The depth of cut is 0.125 in. The feed rate is 30¾ ipm with the cutter speed set at 357 rpm. The chip load under these conditions is 0.012 in.; yet a very satisfactory finish is produced. An estimated horsepower of 6.5 is consumed in removing metal at the rate of 9 cu in. per min. It is interesting to note that this is six to seven times faster than that obtained by traditional methods. In fact, it is extremely doubtful that a high speed steel cutter could successfully mill this low machinability material, SAE X1020, except perhaps with feed rates reduced to 4 or 5 ipm.

In addition to the cutting and clearance angles and other operating characteristics detailed, the following specifications in the grinding of the cutter are of extreme importance. The K-land or that portion of the solid carbide blade which comes in contact with the workpiece is, under usual conditions, ground to a width equal to 1½ times the chip thickness. (This is

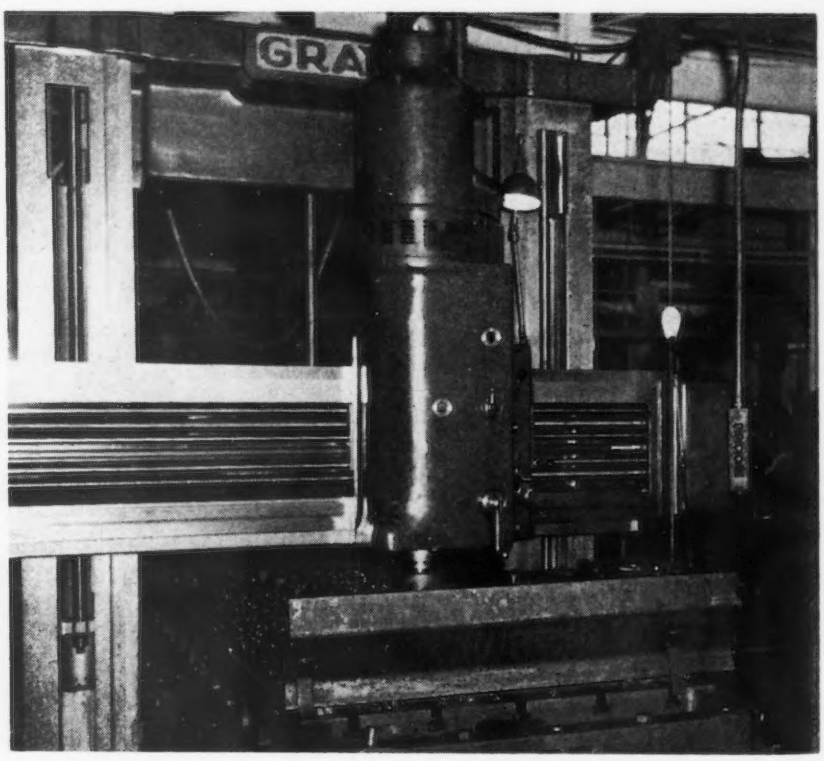


FIG. 35—Heavy planer-type mill used for machining stress-proof steel. This type of equipment is very suitable for carbide work because of its great rigidity.

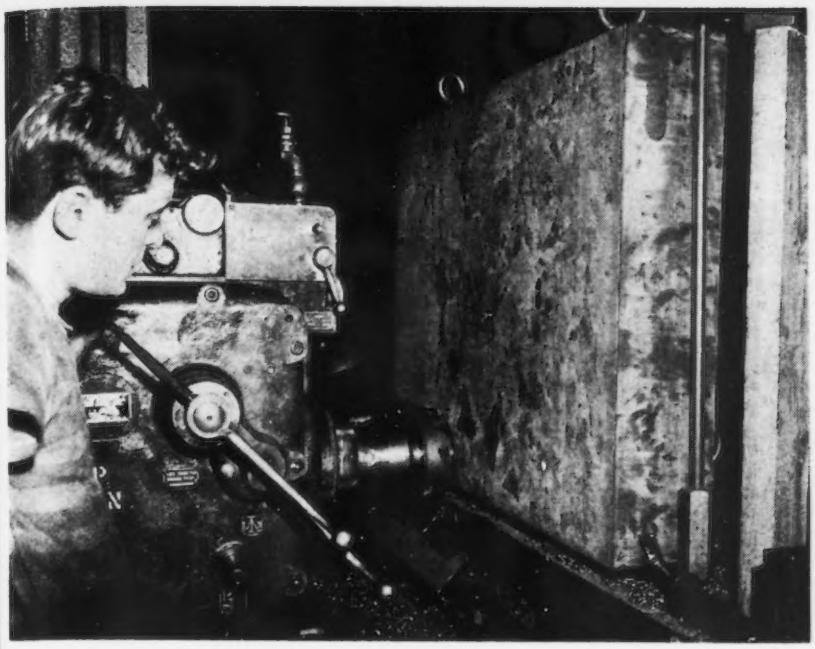


FIG. 36—Setup for milling a 3x4 ft die plate on a horizontal mill taking 5-in. wide cuts with an 8-in. cutter. With a feed of 17 ipm, 18 cu in. per min are removed.

necessary since the milling chips increase in thickness approximately 50 pct due to compression.) Thus ground, the K-land will produce open, thick chips that require very little power for their formation. If, however, this K-land is ground considerably wider, then the chips are more tightly coiled; and while such chip formation requires additional power, it is sometimes necessary to incorporate this grinding specification into the solid carbide blade. This is particularly true of the K-land used successfully to mill SAE X1020. With chips more tightly coiled they are more easily ejected or thrown off by the cutter body and hence are less likely to interfere. The danger of sticking to the cutter body and the blades is thus minimized, if not entirely eliminated. If these specifications and precautions are observed in the milling of materials such as SAE X1020, carbide can be successfully applied.

Milling Stress-Proof Steel

The general appearance of the machine on which is performed the milling of stress-proofed steels to be covered here is shown in fig. 35.

As will be evident from an inspection of this illustration, this interesting operation is performed on a large planer-type milling machine, whose rigidity makes for excellent carbide milling results. The sturdy cross rail with a generously designed head makes possible milling wide surfaces as shown with very satisfactory results as regards the matching of the cuts.

The 10-in. diam face mill, having ten carbide blades, is ground with the customary cutting angles of 7° negative radial rake and 7° negative axial rake, including the 15° corner angle. However, the clearance angles, for satisfactory operation, have been changed as follows: The OD clearance angle is 7° (as is customarily used for steels of low or normal Brinell hardness) and 15° on the face cutting angle. This latter is extremely important for good results. Asmaller clearance angle results in unusual wear on the face and an early breakdown of the carbide on that plane.

A spindle speed of 150 rpm to provide a 400 surface foot rate is selected. While the Brinell hardness of this stress-proof steel is high, experience indicates the necessity for restricting the surface foot rate somewhere in the neighborhood of 400. Since a chip load of 0.10 in., as is considered good milling practice generally, is chosen, 0.10 in. is the feed per revolution. At 150 rpm the rate at which the table carries this interesting workpiece into the cutter is 15 ipm.

Cuts approximately 8 in. wide are taken at each pass. These then are matched by leaving the vertical setting of the cutter the same for each pass. A machine tool having sufficient accuracy and precision built into it will make matching possible. Owing to the nature of the cut, all cuts, except the last, require milling to a shoulder. The K-factor for this operation is approximately 0.9.

Stress-proof steel such as is widely used in the machine tool industry, can be successfully carbide milled. The face clearance angle referred to previously is considered critical and cannot be varied, at least downward, with impunity.

Until recently the machining of a component such as this was considered possible only on a planer. This is no longer true with availability of adequate machine tools (sufficient precision for the matching of cuts) and a good grade of carbide used in conjunction with the proper carbide milling technique.

Milling Die Plates

Dies plates or shoes, usually of an alloy material, present some interesting features when carbide milling is applied to reduce time consuming planer operations.

The problems involved in milling these die plates successfully will be given detailed consideration with special emphasis on those critical factors which, if properly handled, will lead to success. Fig. 36 shows the miling operation with a 36x48x4-in. die plate set up on the bed of a large horizontal mill. An 8-in. diam face mill is mounted on a 6-in. bar, and cuts approximately 5½ to 6 in. wide are taken at each pass. For this operation the following operating statistics are given: The spindle speed selected is 225 rpm which, with an 8-in. diam cutter, results in 472½ sfm. A relatively high surface foot rate is necessary in order to successfully eject the chips and prevent interference.

If the depth of cut is greater than 0.250 in., the width of the cut should be slightly reduced to approximately 4 in. The lessened line of contact between the cutting blade and the workpiece, and therefore, the decreased chip length, prevents troublesome chip interferences. If the depth is greater than 0.250 in. and the width of the cut is as great as 5 in. or

more, chip interference will prevent the operation from being successful.

The feed rate of 17 ipm is selected for this operation. This is based upon a 0.010-in. chip load per tooth or 0.080 ipr. With a spindle speed of 225, as previously stated, the feed is approximately 17 ipm. The chip load should seldom be selected less than 0.010 in. Close curled chips are more difficult to control and are likely to add to the difficulties of interference. The amount of this interference increases as the width of the cut increases, and since all the cuts are to a shoulder the total chip length is considerably greater than the width of the cut. It is necessary, therefore, for the cutter to attempt to prepare this excessively long chip for proper ejection and thus prevent cutter interference. This becomes impossible if the length of this cut is increased unduly by increasing the width. Usually a ratio of a 5-in wide cut to an 8-in. diam cutter (where it is true face milling) represents good practice.

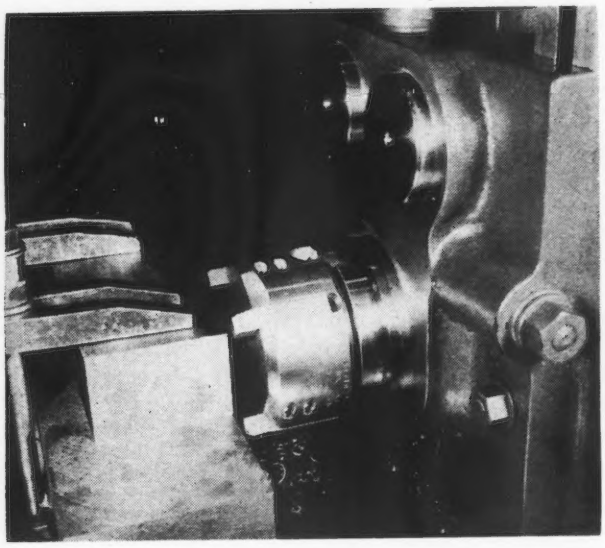


FIG. 37—Well liked in the field and finding considerable application is this axial type of cutter in which the blades are set parallel to the axis.

Under these conditions approximately 18 cu in. of metal per min are removed. This represents a spindle load of approximately 12 hp which in turn results in a K-factor of approximately 0.7. This K-factor increases as the length of the chip increases, due to greater friction arising from chip interference.

Perhaps the most critical feature of this operation is the use of proper clearance on corner angles. It is absolutely essential that a 15° face clearance angle be used for good results on this job. A face clearance angle even slightly less than 15° will result in interference on the face, undue wear on that portion of the carbide blade and, therefore, early breakdown resulting in reduced cutter life. In addition, however, it is also essential that a radius be drawn into the corner of the carbide blade.

Regardless of the corner angle used, whether 0°, 15° or 45°, a radius should be ground between the cutting face of the carbide and the OD edge of the blade. A 45° and even a 60° corner angle gives better results than a 15° corner angle. But unless a radius joins the cutting face and the OD edge of the solid carbide blade, it will be impossible to get satisfactory and economical cutter life. But with this specification ground into the solid carbide blade, the milling of die plates or shoes will be successful.

In place of the cutter described previously, a different type may be employed as shown in fig. 37. Here the solid carbide blades are set parallel to the axis and therefore, referred to as axial type. The same precautions are, however, to be observed for success. The 15° face clearance angle, corner angle preferable 45° or 60°, and a radius joining the cutting face and the OD edge of the blade are critical specifications and must be set up in the cutter.

Small die shoes are more commonly milled on a vertical machine, and for these a spindle speed of 250 rpm is recommended with an 8-in. cutter and a feed of 25 ipm. If the depth of cut does not exceed 0.150 in., a chip load somewhat in excess of 0.010 in. is considered advisable from a cutter life standpoint. This caution should be observed to prevent undue chip interference which would result in an increased K-factor.

Part 6 of this series on carbide milling will appear in the next issue.—Ed.

Previous articles in this series covering carbide milling were as follows:

Part No.	Subject	Issue Date
Part 1	Fundamentals of Carbide Milling	Feb. 13, 1947
Part 2	Low Carbon Steel and Wrought Iron	Feb. 20, 1947
Part 3	Straight Carbon and Cast Steel	Feb. 27, 1947
Part 4	Heat-Treated Steels	Mar. 6, 1947

No general rules can be set down for the milling of all alloy steels. The ranges of surface foot rates set forth for the various operations presented in this discussion represent guide posts to be followed. Certain precautions in the milling of wide surfaces requiring numerous passes must be observed, such as the reduction of the width of the cut, the reduction in the depth of the cut or the reduction in the chip load.

200-Ton Door Made of Aluminum Alloy

WHAT is claimed to be the largest door in the world is to be fitted to the new aircraft assembly hall at Filton, Bristol, England, built to house the Brabazon Mark I aircraft, according to the *Foundry Trade Journal* (London). It is the first all-aluminum-alloy door to be used for this type of construction. The problem was to enclose an opening 1045 ft long by 65 ft 9 in. high. Each section of the door consists of a series of 32 leaves, 65 ft 9 in. high by 5 ft 6 in. wide, and of double thickness; the leaves are hung in pairs on self-aligning hinges which, in turn, are bolted to a sliding upright, carried on its base by specially designed taper, roller-bearing wheels, running on a double track. These sections are unattached, and can open from the ends or from the center, stopping at any point. The entire door weighs only 200 tons, and can be thrown open in the record time of 2 min.

High-Temperature High-Strength Porcelains

NEW all-crystalline porcelains, having exceptional mechanical and dielectric strength at temperatures extending up to 2000°F, have been developed in the Porcelain and Pottery Laboratory at the National Bureau of Standards. Such porcelains are said to be particularly valuable for sustaining loads at elevated temperatures, as electrical insulators at elevated temperatures, and as insulators for such special applications as aviation spark plugs and radar transformers.

The composition of these new porcelains is characterized by the use of such materials as alumina, beryllia, zirconia and thoria, with minor additions of other metallic oxides, and by the absence of silica. A representative high-beryllia porcelain contains 84 pct beryllia and 8 pct zirconia, with small amounts of lime and alumina. A typical high-zirconia composition is 80 pct zirconia, 10 pct beryllia and 10 pct magnesia.

In 1940 the Bureau began a series of investigations to develop glass-free ceramic bodies of the porcelain type which would have simple compositions favorable to high mechanical strength, particularly at elevated temperatures, and good resistance to thermal shock, properties not found in the conventional porcelains. The work, initially undertaken as a fundamental contribution in the field of ceramics, was accelerated by the wartime demands for a material that would resist deformation at temperatures up to 2000°F for use in jet propulsion and gas turbine engines. A decided advantage of ceramic materials for this purpose, if other properties are satisfactory, is their low density as compared with the high-temperature metallic alloys. Accordingly, the investigation was extended under the sponsorship of the NACA to include strength and creep characteristics in pure tension at temperatures ranging from 1500° to 2000°F. On the basis of preliminary tests, six compositions were chosen for further study, and tension specimens were made commercially from specifications furnished by the Bureau.

Tensile tests require perfect alignments of the stressing members and freedom from bend of the specimen. Furthermore, the supporting members must be of a material that will withstand the stresses and temperatures involved. Therefore adapters, through which stress may be applied to the specimens, were perfected.* These adapters are porcelain cylinders, threaded internally on one end to receive the tension specimens and externally on the opposite end. The assembly of tension specimen and two adapters is of such length that the outer ends of the adapters protrude from the furnace. The adapters, in turn, screw into brass heads which connect through universal joints to the loading device.

The adapter is illustrated in THE IRON AGE, *Jan.* 2, 1947, *p.* 98.

Creep or extension of the specimens under load is indicated by a gage similar in principle to those used at the Bureau for measuring creep of metals. Fabricated from platinum-rhodium alloy, it consists of a cutaway tube and a wire that moves freely in this tube. When cemented to the specimen in two places, relative movements of the specimen are determined by observing reference lines on the wire and on the cutaway section of the tube. By a special optical instrument—an illuminated Gaertner extension-viewing device provided with a filar micrometer eyepiece—measurements of the creep may be observed with a precision of 1 micron, and readings interpolated to 0.1 micron. Two gages, 180° apart, are used in each test.

In the early phases of the body development work, preceding the creep tests, a furnace was designed for the high temperatures required. Capable of accurate control at high temperatures, the furnaces are electrically heated with special oxide resistors that are stable in an oxidizing atmosphere. Furnaces have been built that have attained a temperature of 3700°F. By means of a combination of manual and automatic temperature controls, an average air temperature may be maintained over the entire gage length to ±5°F.

Tests show that all of the compositions are very resistant to deformation or creep at temperatures up to 1800°F for long periods of time. A typical specimen, for example, showed an elongation of 0.23 pct after a total of 2600 hr, during which the applied stresses ranged from 9000 to 14,000 psi. At temperatures of 1900°F and higher, however, the tendency to creep is more pronounced and appreciably lower stresses produce a creep rate measurable by the hour.

Magnesium Research Reports Available to Industry

RESULTS of American wartime research on many phases of magnesium metallurgy and fabrication techniques are covered in a series of 45 reports available to industry through the Office of Technical Services, Washington. The research activities covered in these reports were conducted by manufacturing concerns, universities and research institutions under contract with OSRD and other federal agencies.

The major classifications covered in these reports are: Deformation Characteristics of Magnesium Alloys; Cast Magnesium Alloys and Foundry Techniques and Practices; Fatigue Properties of Magnesium Alloys and Structures; Properties and Heat Treatment of Magnesium Alloys; Formability of Magnesium Alloy Sheet; Physical and Stress Corrosion Properties of Magnesium Alloy Sheet; Protective Coatings for Magnesium and Its Alloys; Susceptibility of Four Magnesium Casting Alloys to Microporosity and Its Effect on Mechanical Properties; Effect of Porosity Upon the Tensile Strength of Some Magnesium Alloy Castings; High Temperature Properties of Light Alloys.

A complete listing of all the reports available, together with information on cost of copies, may be obtained by writing the Reader Service Dept., THE IRON AGE, 100 E. 42nd St., New York 17.

Tool engineers to convene in Houston for the 15th Annual Meeting, March 19, to 22, 1947 . . . Comprehensive technical program will cover crush dressing, carbide tooling, magnesium fabrication . . . Meeting theme is "more goods for more people, for less money, while paying higher wages."

Moving into the Southwest for the first time in its history, the American Society of Tool Engineers will hold its 15th Annual Convention in Houston, Texas, March 19 to March 22, 1947. There will be no tool show, but the technical sessions will be among the best, if not the very best ever scheduled for such a meeting.

Built around the same general theme as those for the semi-annual meeting planned originally to be held in Pittsburgh, last fall, but cancelled on account of the strike situation in that city, the seminars will feature papers and presentations by outstanding industrialists and technicians, all attuned to the same basic thought of "more goods for more people, for less money, while paying higher wages."

Prominent industrialists and technicians who have played important parts in the establishment of the many and varied industries that now contribute to the economic importance of Houston will participate in the technical programs. With these will be educators, engineers and executives from all parts of the country, each of established reputation in his own field.

The subjects chosen for the sessions will appeal to tool engineers from all branches of the industry, and include such varied subjects as crush dressing, carbide applications, oil exploration, magnesium fabrication and education. A program of educational motion pictures will be featured each morning except Saturday.

The customary banquet will be omitted, and the newly elected national officers will be installed at a short national membership meeting to be held at 7:30 P. M. on Friday. In place of the banquet, Saturday will be devoted to a special Texas Day program featuring an old fashioned barbecue and rodeo to be held at the LH-7 ranch near Houston.

Proceedings will open on Wednesday afternoon, March 19, at 2 P. M., with a session entitled "Crush and Diamond Dressing of Grinding Wheels." Keynote speaker will be Frank J. Tone, Jr., son of one of the founders of the Carborundum Co., and vice-president and general sales manager, Carborundum Co., Niagara Falls, N. Y. His talk will deal with "Development and Selection of Wheels." The second speaker, Ernest V. Flanders, chief engineer, thread grinding div., Jones & Lamson Machine Co., Springfield, Vt., will handle the subject from the standpoint of "Grinding Wheel Applications."

At 8 P. M., James F. Lincoln, president, Lincoln Electric Co., Cleveland, will present a paper "Incentive and Enterprise." Well known for his attitude toward labor relations, not only in the welding field, but throughout industry in general, Lincoln will explain what he terms "intelligent selfishness," and will show that by the proper use of production stimulants it is possible to pay greatly increased wages, increase employment, pay substantially higher dividends, and at the same time reduce prices.

Thursday morning's program will be given by A. A. Nicholson, ass't. to the vice president, The Texas Co., New York City. His subject will be "The Tool Engineer Looks at Oil." This talk will take the form of a nontechnical presentation on how oil is found, processed and developed into the many petroleum products in common use throughout industry. It will be illustrated by specially made lantern slides.

"Magnesium and Plastics Fabrication" will form the background of the Thursday afternoon session to be handled by N. D. Griswold, ass't. general manager, Texas div., The Dow Chemical Co. Relative newcomers in Texas, these two activities now bulk large in the industrial picture of the Southwest. Warm water from the Gulf is processed into metallic magnesium at Freeport, and in the same plant, natural gas, stripped from oil, is so treated as to emerge as new chemicals and plastics.

The always interesting question as to the place of the tool engineer in the professional world will be discussed on Thursday evening under the heading of "The Professional Approach to Tool Engineering." The first phase, "Manufacturing Analysis," will be presented by Prof. Halsey F. Owen, Dept. of Industrial Engineering, Purdue University, who will outline financial and technical aspects. The second phase, "What Industry Expects in the Development

of Tool Engineers," will be expounded by William D. Merrifield, assistant to director of technical education, Chrysler Corp., Detroit. Mr. Merrifield's exposition will be challenged by Dr. Willis R. Woolrich, speaker for the third section of the program. Dr. Woolrich, Dean of Engineering, University of Texas, and a former practicing engineer, will discuss "What Education Can Do in the Development of Tool Engineers."

On Friday morning the technical session will deal with "Specialized Precision Instruments." The first speaker, J. H. Dunaway, Sr., research geophysicist, Humble Oil & Refining Co., will explain the "Manufacture and Use of Geophysical Instruments." I. K. Fussell, production engineer, Schlumberger Well Surveying Corp., Houston, will discuss "Precision Instruments Used in Oil Well Surveying."

"Principles of Design for Carbides, and Unusual Applications" will form the subject of the Friday afternoon session to be presented by Philip McKenna, president, and W. L. Kennicott, chief engineer, Kennametal Inc. Delving into the history, development, and composition of cemented carbides, Mr. McKenna will show the effects of various components, and will point out their importance in the finished product. He will also indicate the various factors which govern the design of carbide cutting tools. Mr. Kennicott will demonstrate some of the unusual applications of carbides, as distinct from their use as cutting tools.

Col. Willard F. Rockwell, president, Rockwell Mfg. Co., Pittsburgh, will keynote the closing session on Friday evening with an address on "Business and the Manufacture of Special Valves and Meters." Technicians from the Rockwell California valve plant and the Pittsburgh meter works will discuss valve and meter manufacture and application.

ALBERT M. SARGENT, president, Pioneer Pump & Mfg. Co., and Pioneer Engineering & Mfg. Co., Detroit, and national president, ASTE, 1946-47, will preside at the convention.

Technical Program of Fifteenth Annual ASTE Meeting

Wednesday, March 19

2:00 P. M.

Subject: Crush and Diamond Dressing of Grinding Wheels

Chairman: F. J. Schmitt, director of sales, D. A. Stuart Oil Co., Chicago.

Speakers: *Development and Selection of Wheels* by Frank J. Tone, Jr., vice-pres. and gen. sales mgr., The Carborundum Co., Niagara Falls, N. Y.

Grinding Wheel Applications by Ernest V. Flanders, chief eng., thread grinding div., Jones & Lamson Machine Co., Springfield, Vt.

8:00 P. M.

Subject: Incentive and Enterprise

Chairman: E. W. Baumgardner, prod. eng., Industrial Ovens, Inc., Cleveland.

Speaker: James F. Lincoln, pres., the Lincoln Electric Co., Cleveland, Ohio.

Thursday, March 20

9:00 A. M.

Subject: The Tool Engineer Looks at Oil

Chairman: F. E. Doty, Jr., Owner, Engineering Sales Co., Houston.

Speaker: A. A. Nicholson, asst. to vice-pres., The Texas Co., New York City.

2:00 P. M.

Subject: Magnesium and Plastics Fabrication

Chairman: Stephen Urban, Tool and Gage Eng., Pratt & Whitney Div., Niles-Bement-Pond Co., Syracuse.

Speaker: N. D. Griswold, asst. gen. mgr., Texas Div., The Dow Chemical Co., Freeport, Texas.

HARRY E. CONRAD, executive secretary ASTE. Upon his shoulders rests the responsibility for organizing the many details necessary for a successful annual meeting.

8:00 P. M.

Subject: The Professional Approach to Tool Engineering

Chairman: O. W. Winter, vice-pres., Acme Pattern and Machine Co., Buffalo.

Speakers: *Manufacturing Analysis* by Prof. Halsey F. Owen, Dept. of Ind. Eng., Purdue University, Lafayette, Ind.

What Industry Expects in the Development of Tool Engineers by William D. Merrifield, asst. to Director of Technical Education, Chrysler Corp., Detroit.

What Education Can Do in the Development of Tool Engineers by Dr. W. R. Woolrich, Dean of Engineering, University of Texas, Austin, Texas.

Friday, March 21

9:00 A. M.

Subject: Specialized Precision Instruments

Co-Chairmen: Homer Briggs, Asst.

(CONCLUDED ON PAGE 162)

Western Metal Congress

E. S. HUDSON, chairman of the Western Metal Congress general committee. Mr. Hudson is manager of Western Forge & Tool Works.

HIGHLIGHTED by some 75 technical discussions and 175 equipment and material exhibitors, the fifth Western Metal Congress and Exposition will be held at the civic auditorium, Oakland, Calif., Mar. 22 to 27. This year's congress marks the resumption of this meeting after a six-year wartime absence.

Sponsored by the American Society for Metals and 16 other cooperating technical societies, the meetings and other educational activities will be held in the same building in which the equipment exhibition will be staged. Close to 50,000 metal industry executives and engineers are expected to attend the five-day meetings and since it will be the first post-war congress held on the West Coast, many processes and materials not previously exhibited in that section are expected to be on display. The technical sessions will cover many phases of the metal working field and will feature addresses by outstanding authorities. A detailed listing of papers to be presented at the congress follow this report.

In addition to the ASM, the following societies are cooperating in the exposition: American Chemical Society, American Foundrymen's Assn., American Industrial Radium and X-Ray Society, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Petroleum Institute, American Society for Testing Materials, American Society of Tool Engineers, American Welding Society, Mining Association of California, Northwest Electric Light and Power Association, Pacific Coast Electric Association, Pacific Coast Gas Association, Purchasing Agents Association of California, Society of Automotive Engineers, and Western Oil and Gas Association.

E. S. Hudson, manager, Western Forge & Tool Works, Oakland, is chairman of the general committee for the congress. F. B. Drake, president Johnson Gear & Mfg. Co., Ltd., Berkeley, Calif., and C. D. D'Amico, metallurgist, Joseph T. Ryerson & Sons, Los Angeles, are vice-chairmen; and Harold E. Krayenbuhl, engineer, Oliver United Filters, Inc., Oakland, is secretary. Other committee chairmen are as follows:

Program Committee—John E. Dorn, University of California, Berkeley.

Exhibit Committee — William Fletcher, E. P. Houghton & Co., San Francisco.

Subcommittee for American Foundrymen's Association — R. Vosbrink, Berkeley Pattern Works, Berkeley.

Subcommittee for American Welding Society—E. W. Bartz, Westinghouse Electric Corp., San Francisco.

Cooperating Societies Committee—David Reeder, Electro-Metallurgical Sales Corp., San Francisco.

Publicity Committee—William Butts, General Metals Corp., Oakland.

Information and Registration Committee—George Huck, Bethlehem Pacific Coast Steel Corp., San Francisco.

Entertainment Committee—H. P. Etter, Air Reduction Sales Co., San Francisco.

Attendance Committee—George Burnside, Coulter-Sibbett Steel Co., Oakland.

ASM Technical Sessions at Western Metal Congress

Monday, March 24

9:00 A.M.—*Principles of Heat Treatment of Steels* (Lecture No. 1), by E. E. Thum, Editor, *Metal Progress.*

10:00 A.M.—*Electron Microscopy* by David Harker, General Electric Co.

10:00 A.M.—*Toolsteels* by Norman Stotz, Braeburn Alloy Steel Corp.

11:00 A.M.—*Interpretation of Creep and Stress-Rupture Data* (Lecture No. 1), by F. B. Foley, Midvale Co.

11:00 A.M.—*Physical Chemistry of Steelmaking* (Lecture No. 1), by John Chipman, Massachusetts Institute of Technology.

2:00 P.M.—*Physical Metallurgy of Stainless Steels* (Lecture No. 1), by V. N. Krivobok, International Nickel Co.

2:00 P.M.—*Effect of Residual Stresses on the Fatigue Strength of Metals* (Lecture No. 1), by John O. Almen, General Motors Corp.

3:00 P.M.—*Physical Metallurgy*

First postwar exposition in San Francisco area features 75 technical discussions and 175 exhibitors . . . Meeting will run from Mar. 22 to 27 and will cover wide variety of metalworking problems.

J. E. DORN University of California, chairman of the Western metal congress program committee.

Aluminum Alloys (Lecture No. 1), by E. H. Dix, Jr., Aluminum Co. of America.

3:00 P.M.—*Theory of Corrosion*, by R. M. Burns, Bell Telephone Laboratories.

4:00 P.M.—*Industrial Growth of the West*, by F. T. Letchfield, Wells Fargo Bank & Union Trust Co.

8:00 P.M.—*Correlation of Recent Data on Hardenability*, by A. L. Boegehold, president, ASM, and Head, Metallurgical Department, Research Laboratories Division, General Motors Corp.

Tuesday, March 25

9:00 A.M.—*Principles of Heat Treatment of Steels* (Lecture No. 2), by E. E. Thum.

10:00 A.M.—*Fabrication of the Brasses*, by Harry P. Croft, Chase Brass & Copper Co.

10:00 A.M.—*Toolsteels*, by William H. Wills, Allegheny Ludlum Steel Corp.

11:00 A.M.—*Interpretation of Creep and Stress Rupture Data* (Lecture No. 2), by Francis B. Foley.

11:00 A.M.—*Physical Chemistry of Steelmaking* (Lecture No. 2), by John Chipman.

2:00 P.M.—*Physical Metallurgy of Stainless Steels* (Lecture No. 2), by V. N. Krivobok.

2:00 P.M.—*Effect of Residual Stresses on the Fatigue Strength of Metals* (Lecture No. 2), by John O. Almen.

3:00 P.M.—*Physical Metallurgy of Aluminum Alloys* (Lecture No. 2), by E. H. Dix, Jr.

3:00 P.M.—*Preparation of Surfaces for Protective Coatings*, by James R. Ewing, Solventol Chemical Products, Inc.

4:00 P.M.—*Nondestructive Testing by Means of the Supersonic Reflectoscope*, by Floyd Firestone, consulting physicist.

4:00 P.M.—*New Approaches in Heat Treatment*, by Glen Riegel, Caterpillar Tractor Co.

Wednesday, March 26

9:00 A.M.—*Hardenability of Steels*, by W. E. Jominy, Chrysler Corp.

10:00 A.M.—*Tool Materials and Their Application*, by A. H. d'Arcambal, Pratt & Whitney Division.

10:00 A.M.—*Controlled Atmospheres*, by H. M. Heyn, Surface Combustion Co.

11:00 A.M.—*Alloys for Ultra High-Temperature Service*, by F. S. Badger, Haynes Stellite Co.

11:00 A.M.—*Steel Melting Practice*, by C. H. Herty, Jr., Bethlehem Steel Co.

2:00 P.M.—*High Chromium Irons*, by H. D. Newell, Babcock & Wilcox Tube Co.

2:00 P.M.—*Plasticity of Metals*, by John H. Hollomon, General Electric Co.

3:00 P.M.—*Physical Metallurgy of Aluminum Alloys* (Lecture No. 3), by E. H. Dix, Jr.

3:00 P.M.—*Protective Coatings*, by R. M. Burns, Bell Telephone Laboratories.

4:00 P.M.—*X-Ray Diffraction*, by Kent R. Van Horn, Aluminum Co. of America.

Thursday, March 27

9:00 A.M.—*Research in Carbon Steels*, by Harold K. Work, Jones & Laughlin Steel Corp.

10:00 A.M.—*Heat Treatment of Precision Cutting Tools*, by A. H. d'Arcambal, Pratt & Whitney Division.

11:00 A.M.—*Alloys for Low-Temperature Service*, by S. L. Hoyt, Battelle Memorial Institute.

2:00 P.M.—*Stainless Steels in Aircraft*, by Given Brewer, consulting metallurgist.

2:00 P.M.—*Fracture of Metals*, by John H. Hollomon, General Electric Co.

3:00 P.M.—*Recent Developments in Magnesium Alloys*, by J. C. McDonald, Dow Chemical Co.

3:00 P.M.—*Recent Advances in Powder Metallurgy*, by Earl R. Parker, University of California.

4:00 P.M.—*Mechanical Testing*, by Arthur E. Focke, Diamond Chain & Mfg. Co.

4:00 P.M.—*Electron Microscope*, by Charles Banca, Radio Corp. of America.

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American Welding Society Technical Sessions

Monday, March 24

9:00 A.M.—*Hard Facing—a Major Factor in Manufacture and Maintenance*, by H. W. Sharp, Stoody Corp.

10:00 A.M.—*Welding Stainless and Heat Resisting Alloys*, by T. R. Lichtenwalter, Republic Steel Corp.

11:00 A.M.—*Oxyacetylene Pressure Welding*, by E. R. Proctor, Menasco Mfg. Co.

Noon—Official Convention Luncheon

Master of Ceremonies—Charles Smith, Linde Air Products Co.

Welcoming Remarks, Carl J. Eastman, president, San Francisco Chamber of Commerce.

Welcoming Remarks, James H. L'Hommedieu, President, Oakland Chamber of Commerce.

The Future of Welding in the West, by Lee Delhi, National A.W.S. President.

Presentation of Lincoln Gold Medal Award to H. E. Kennedy.

Tuesday, March 25

9:00 A.M.—*Future of Resistance Welding*, by M. S. Clark, Federal Welding Co.

10:00 A.M.—*Resistance Welding Applications*, by J. H. Cooper, Taylor-Winfield Corp.

11:00 A.M.—*Possibilities of Electronic Control*, by G. W. Garmon, General Electric Co.

2:00 P.M.—*Electrode Alloys for Resistance Welders*, by G. N. Sieger, S.M.S. Corp.

3:00 P.M.—*Inert Gas Shielded Arc Welding*, by T. E. Piper, Northrup Aircraft, Inc.

Wednesday, March 26

9:00 A.M.—*Submerged Arc Welding in Light Gage Metals*, by H. E. Kennedy, Albany, Calif.

10:00 A.M.—*Thermit Welding of Rails and Large Castings*, by J. B. Tinnon, Metal & Thermit Corp.

11:00 A.M.—*Welding and Fabricating of Heavy Alloys for High-Temperature and Corrosion Applications*, by Charles G. Chisholm, Haynes Stellite Co.

2:00 P.M.—*Modernized Fabrication*, by Earl Griffeth, Wooldridge Mfg. Co.

3:00 P.M.—*Coordinated Developments in AC Welders and Electrodes*, by C. P. Croco, Westinghouse Electric Corp.

Thursday, March 27

9:00 A.M.—*Modern Design in Structural Welding*, by LaMotte Grover, Air Reduction Sales Co.

10:00 A.M.—*Low Temperature Brazing*, by Herman Folgner, Handy & Harman.

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American Foundrymen's Assn. Technical Meetings

Monday, March 24

Luncheon Meeting, Hotel Leamington, Oakland.

Chairman—Richard Vosbrink, President, Northern Calif. Chapter, A.F.A.

The Future for Industry in the West, by Don Follet, Oakland Chamber of Commerce.

2:00 P.M.—*Aluminum Castings*, by Roy Paine, Aluminum Co. of America.

3:30 P.M.—*Brass and Bronze Castings*, by George Dreher, National Director, AFA.

Tuesday, March 25

2:00 P.M.—*Core Blowing*, by L. D. Pridmore, International Molding Machine Co.

3:00 P.M. — *Foundry Sands*, Sand Committee of Northern California Chapter, AFA. (Harold E. Henderson—Iron; James L. Francis—Steel; George Stewart — Nonferrous.)

Wednesday, March 26

2:00 P.M.—*Steel Castings*, by speaker to be announced.

3:30 P.M.—*Iron—Cupola Melting*, by J. T. MacKenzie, American Cast Iron Pipe Co.

Thursday, March 27

2:00 P.M.—*Safety Code for Foundries*, by speaker to be announced.

3:00 P.M.—*Standards, Inspection, and Repair of Aircraft Quality Castings*, by T. E. Piper, Northrup Aircraft, Inc.

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Exhibitors at Western Metal Congress

— A —

Acme Associates, Los Angeles
Acme Tool Co., New York
Air Reduction Sales Co., New York
Air Speed Tool Co., Los Angeles
Allegheny Ludlum Steel Corp., Brackenridge, Pa.
Allen Manufacturing Co., Hartford.
Allied Products Corp., (Richard Bros. Div.), Detroit
Alloy Rods Co., York, Pa.
Allube Corporation, Glendale, Calif.
Ambrit Industries, Glendale, Calif.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Ampco Metal, Inc., Milwaukee
Austenal Labs., Inc., New York

— B —

Baldwin Locomotive Works, Eddystone, Pa.
Barrett Cravens Co., Chicago.
Bartells Co. of Calif., E. J., San Francisco
Bausch & Lomb Optical Co., Rochester, N. Y.
Benbow Maufacturing Co., Redwood City, Calif.
Black Drill Co., Cleveland
Blakeslee & Co., G. S., Chicago
Braeburn Alloy Steel Corp., Braeburn, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia
Bryant Heater Co., Cleveland
Buehler, Ltd., Chicago
Buehrer Associates, E. C., San Francisco

— C —

California Saw Works, San Francisco
Carborundum Co., Niagara Falls, N. Y.
Carpenter Steel Co., Reading, Pa.
Cerro de Pasco Copper Corp., New York
Coffing Hoist Co., Danville, Ill.
Commander Mfg. Co., Chicago
Composite Die Supply Co., Los Angeles
Composite Forgings, Inc., Detroit
Coulter Steel & Forge Co., Emeryville, Calif.

— D —

DCMT Sales Corp., New York
Detrex Corp., Detroit
Diamond Machine Tool Co., Los Angeles
DoAll Co., Minneapolis
DoAll San Francisco Co., San Francisco

— E —

Eclipse Fuel Engineering Co., Rockford, Ill.
Edwards, Inc., S. H., Richmond, Calif.
Electric Steel Foundry Co., Portland, Ore.
Electro Metallurgical Co., New York
Electro Refractories & Alloys, Buffalo
Electroloy Co., Inc., Bridgeport, Conn.
Elwell Parker Electric Co., Cleveland
Enterprise Engine & Foundry Co., San Francisco
Eutectic Welding Alloys Corp., New York
Everede Tool Co., Chicago

— F —

Farrar Industrial Products Co., Los Angeles
Federal Machine and Welder Co., Warren, Ohio
Federal-Mogul Corp., Detroit
Foxboro Co., Foxboro, Mass.
Frontier Bronze Corp., Niagara Falls, N. Y.

— G —

General Electric Co., Schenectady, N. Y.
General Electric X-Ray Co., Schenectady
General Foundry Service Co., Oakland
General Metals Corp., Oakland, Calif.
Gordon Electronics, Inc., Pittsburgh

— H —

H & H Research Co., Detroit
HPL Manufacturing Co., Cleveland
Hamilton Mfg. Co., Two Rivers, Wis.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.

R. VOSBRINK, Berkeley Pattern Works, who is serving as chairman of the subcommittee for the AFA.

Handy & Harman, New York
Harnischfeger Corp., Milwaukee
Haven Saw & Tool Co., Oakland, Calif.
Haynes Stellite Co., Kokomo, Ind.
Hevi Duty Electric Co., Milwaukee
Hough Co., Frank G., Libertyville, Ind.
Houghton & Co., E. F., Philadelphia
Hydropress, Inc., New York

— I, J, K —

Illinois Testing Labs., Inc., Chicago
Immersion Heating Equipment Co., Los Angeles
Induction Heating Co., New York
Industrial Steel Treating Co., Oakland, Calif.
International Nickel Co., New York
Jensen Instrument Co., Los Angeles
Kaiser Co., Oakland, Calif.
King, Andrew, Narberth, Pa.
King & Co., O. L., San Francisco
Kingwell Brothers, Ltd., San Francisco
Knapp Co., James H., Los Angeles

— L —

Lectroetch Co., Cleveland
Leeds & Northrup Co., Philadelphia
Lempco Products Co., Bedford, Ohio
L'Hommedieu & Sons Co., Chas. F., Chicago
Light Metal Age, San Francisco
Lincoln Electric Co., Cleveland
Lindberg Engineering Co., Chicago
Linde Air Products Co., New York
Los Angeles Department of Water & Power, Los Angeles

— M —

Magnaflux Corp., Chicago
Magnelux, Inc., Los Angeles
Mall Tool Co., Chicago
Marwedel, C. W., San Francisco
Material Movement Industries, Chicago
Metal Finishing Service, Chicago
Metal & Thermit Corp., New York
Metallizing Co of America, Chicago
Metaloy Sprayer Co., New York
Modernair Corp., Oakland, Calif.

— N, O —

National Cylinder Gas Co., Chicago
National Industrial Launderers & Cleaners Assoc., Indianapolis
National Pneumatic Co., Rahway, N. J.
Natural Gas Equipment Co., Inc., San Francisco
North American Philips Co., New York
Norton Co., Worcester, Mass.
Oakite Products, Inc., New York
Oakland Chamber of Commerce, Oakland, Calif.
Ohio Crankshaft Co., Cleveland
Oliver Tire and Rubber Co., Oakland, Calif.
Olsen Testing Machine Co., Tinius, Philadelphia

— P —

Pacific Abrasive Supply Co., San Francisco
Pacific Coast Gas Assoc., San Francisco
Pacific Gas & Electric Co., San Francisco
Pacific Graphite Co., Emeryville, Calif.
Pacific Metals Co., San Francisco
Pacific Scientific Co., San Francisco
Pacific Steel Casting Co., Berkeley, Calif.
Pangborn Corp., Hagerstown, Md.
Perin, Ira, San Francisco
Permanente Metals Corp., Oakland, Calif.
Physicists Research Co., Ann Arbor, Mich.
Pines Engineering Co., Aurora, Ill.
Porter Cable Co., Syracuse, N. Y.
Powder Weld, Inc., Brooklyn, N. Y.
Production Engineering Cons., Los Angeles
Progressive Welder Co., Detroit

— R —

Radio Corp., of America, Camden, N. J.
Rapids-Standard Co., Inc., Grand Rapids, Mich.
Reliance Electric & Engineering, Cleveland
Richards Brothers Div., Allied Products Corp., Detroit
Richards Co., J. A., Kalamazoo, Mich.
Riley Precision Tool Co., San Francisco
Ryerson & Son, Inc., Joseph T., Chicago

— S —

"S" Corrugated Quenched Gap Co., Garfield, N. J.
Schneible Co., Claude B., Detroit
Scott & Son, Inc., C. U., Rock Island, Ill.

E. W. BARTZ, chairman of the subcommittee for the AWS program at the congress. Mr. Bartz is associated with Westinghouse Electric Corp., San Francisco.

Shelden Machine Co., Inc., Chicago
Simonds Saw & Steel Co., Fitchburg, Mass.
Smith Co., Lombard, Los Angeles
Solventol Chemical Products, Inc., Detroit
Sommer & Adams Co., Cleveland
South Bend Lathe Works, South Bend, Ind.
Southern California Industrial Cleaners Assoc., Los Angeles
Spencer Turbine Co., Hartford, Conn.
Squires Co., H. B., San Francisco
Stuart Oxygen Co., San Francisco
Stuart Oil Co., D. A., Chicago
Sullivan-Cassimus Co., San Francisco

— T, U, V —

Taylor-Winfield Corp., Warren, Ohio
Texas Co., New York
Tinnerman Products, Inc., Cleveland
Torrington Mfg. Co., Torrington, Conn.
Union Carbide & Carbon Co., New York
U.S. Department of Commerce, San Francisco
U.S. Hoffman Machinery Corp., New York
Upton Electric Furnace Co., Detroit
Vacu Blast Co., Burlingame, Calif.
Vapor Blast Mfg. Co., Milwaukee
Victor Equipment Co., San Francisco

— W, Y —

Waldes-Kohinoor, Inc., Long Island City, N. Y.
War Assets Administration, Washington, D. C.
Warren City Mfg. Co., Warren, Ohio
Wells, Inc., Martin, Los Angeles
Western Machinery and Steel World, San Francisco
Western Metals, Los Angeles
Westinghouse Electric Corp., Pittsburgh
Wilson Mechanical Instrument Co., New York
Yale & Towne Mfg. Co., Philadelphia

Basic Openhearth Slags

Consideration of the mineralogy of openhearth slags and use of the petrographic microscope as a basis for a better understanding of slag constitution is continued in this concluding part of a two-part article. The concepts of slag-metal relations and slag control are also reviewed from the standpoint of reducing lime consumption and slag volume and increasing production rates.

By K. L. FETTERS and E. W. MAHANEY

Special Metallurgical Engineer and Metallurgist, respectively, Youngstown Sheet & Tube Co., Youngstown, Ohio

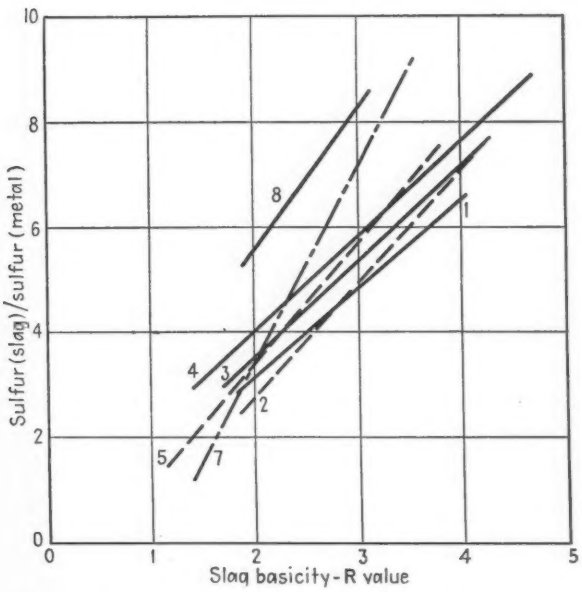

FIG. 9—The sulfur distribution ratio as a function of slag basicity (R). The numbers 1 to 8 indicate increasing carbon contents of samples in that order.

FIGS. 4 through 8 (see part I, issue of Mar. 6, p. 62) illustrate the mineralogy of typical openhearth slags as may be observed with a petrographic microscope. These photomicrographs are at a magnification of about 150X and have been made from thin sections of typical openhearth slags. Since the rate of cooling affects the grain size of the slags, all the specimens were prepared from samples poured into a regular slag sampling steel cup, such as is used in many shops. Although the time required to prepare thin sections precludes such samples as a basis for practical slag control, the examination of rapidly polished opaque sections by means of a regular metallurgical microscope has often been suggested.[8] In the opinion of the authors, a satisfactory control could be instituted by means of such polished opaque samples, except that simple visual observation of slag pats would serve the purpose and interpretation by the laboratory would not be required. Petrographic studies, however, are very useful as a basis for a better understanding of slag constitution and are helpful in ascribing the causes for variability from heat to heat—which might not be detected from the regular slag samples observed visually.

In the first part of this article, THE IRON AGE, *Mar. 6, p. 62, the authors discussed slag, characteristics and the mineralogy of openhearth slags.*

In describing the slags in figs. 4 through 8, the conventions of Mason[9] will be used. Mason classifies slags on the basis of B value where:

$$B = \frac{CaO}{SiO_2 + P_2O_5}$$

The various types of slags are classified according to the following ranges of B values:

(1) Olivine slags (B = 0.9 to 1.4)—The authors refer to these as Monticellite slags, recognizing that the mineral Monticellite ($CaO \cdot MgO \cdot SiO_2$) has had much of the MgO replaced by the oxides of manganese and iron in openhearth slags. Fig. 4 shows an early slag of the Olivine or Monticellite type having a B value of about 1.0.

(2) Merwinite slags (B = 1.4 to 1.6)—The composition of Merwinite is $3CaO \cdot MgO \cdot 2SiO_2$ and this mineral has often been overlooked in slags, since it is not readily distinguished from the more basic olivines, and it is also easily confused with dicalcium silicate. Recognition of this stage in slags is not particularly important since the basicity of finishing slags is always well beyond the Merwinite stage, but it is likely that at some period in most heats this mineral is present.

Fig. 5 shows a slag with a B value of 1.5. The white areas are probably Merwinite and the dark areas FeO-MnO oxide phase. The slags in figs. 6a and 6b are slightly more basic and the prevalence of the dendritic black oxide phase would indicate the replacement of much of the RO of the $CaO \cdot RO \cdot SiO_2$ by CaO. In these slags the white silicate phase has not yet assumed the characteristic rounded shape of grains of dicalcium silicate. It is evident that the slag in fig. 6b has had more of its iron and manganese oxides replaced by CaO than the slag in fig. 6a. The effective or free iron oxide of this second slag should thus be greater.

(3) Dicalcium silicate slags (B = 1.6 to 2.4)—Figs. 7a, -b, and -c, illustrate dicalcium silicate slags. In fig. 7a large masses of dicalcium silicate which have not been in solution in the molten slag are evident, and in

fig. 7b a lump of lime surrounded by dicalcium silicate, as described earlier, may be noted. Fig. 7c shows a typical mature dicalcium silicate slag where the silicate phase has been in solution in the liquid slag.

(4) Tricalcium silicate slags (*B* over 2.4)—Fig. 8 shows the lath-like structure of tricalcium silicate typical of a highly basic slag.

The mineralogical evolution of the slag of the heat described occurs in the following manner:

At the time of the hot metal addition, there is a thin slag on the partially melted scrap, consisting almost entirely of iron oxide plus a little lime. When the hot metal is added, the iron oxide reacts quickly, and sometimes violently, with the silicon and manganese in the hot metal to form SiO_2 and MnO. There will be additional solution of lime in this slag, although until the lime boil is well along, the slag remains acid to semi-basic with CaO/SiO_2 ratios under 2/1. The FeO content of these early slags is likely to be quite high. The structure is essentially monticellite (see fig. 4) and often when the CaO/SiO_2 ratio is about 1/1 and the oxide phases (FeO and MnO) are not excessive, the entire slag structure will be made up of this mineral.

As the lime goes into solution, it will replace the (RO) of the monticellite ($CaO \cdot RO \cdot SiO_2$). Such slags show a lighter colored silicate phase with dendritic oxide phases which appear black (fig. 6a). As the lime continues to enter the slag, there is a transition to dicalcium silicate (Ca_2SiO_4) which occurs in two forms; (1) as small crystals which have precipitated from solution when the slag freezes, and (2) as "blocks" which have not been in solution, as was mentioned earlier (fig. 7a). The more mature basic slags, with CaO/SiO_2 ratio of 2.3/1, should be entirely made up of dicalcium silicate crystals in a dark oxide matrix, as in fig. 7c. On heats in which the basicity approaches a 3/1 ratio, typical tricalcium silicate begins to appear as in fig. 8. Yellow and red crystals of dicalcium ferrites ($2CaO \cdot Fe_2O_3$) may also be found in such highly basic slags when the percentage of FeO in the slag is high. It is evident that the composition and maturity of the slag may be readily followed from the appearance of such petrographic studies, although as mentioned earlier, samples cannot generally be prepared with sufficient rapidity to be used for practical control purposes.

Slag-Metal Relations

The modern concept of oxygen relations between slag and metal has already been discussed. Assuming then that the carbon in the bath determines to a great extent the iron oxide dissolved in the metal, the slag characteristics of principal importance in determining oxidation and rate of carbon drop will be viscosity and temperature. Ore additions are, of course, a ready source of oxygen for removal of carbon, although oxygen transferred from the furnace atmosphere to the slag and thence to the metal is also important. Slags of low viscosity and at a high temperature favor this oxygen transfer. Brower and Larsen[2] also consider the condition of the furnace bottom and its effect on the ease of formation of CO bubbles as of importance in determining the rate of carbon drop. The recent experimental practices of bubbling oxygen through the bath in order to remove carbon should make the control of carbon removal almost independent of slag conditions.

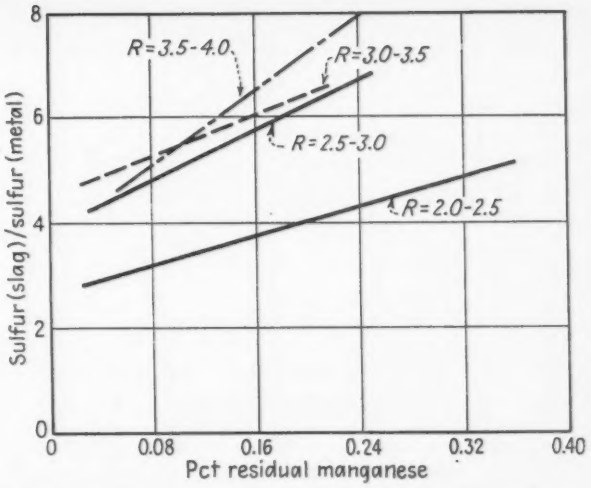

FIG. 10—Variation of sulfur distribution ratio with residual manganese. The data apply to low carbon steel only. The various ranges of slag basicity are shown on the individual curves.

The manganese reaction in the openhearth is as follows:

$$FeO\ (slag) + Mn\ (metal) = MnO\ (slag) + Fe$$

the constant for which is written:

$$K_{Mn} = \frac{(MnO)}{(FeO)\,[Mn]}$$

The manganese equilibrium may be summarized briefly as follows: The slag-metal reactions, as far as manganese is concerned, approach equilibrium rapidly and any consideration of manganese may be estimated from a knowledge of such equilibrium conditions. The effects of temperature and slag basicity on manganese are well known—increasing the temperature decreases the value of K_{Mn} and thus increases the manganese content of the steel, for given slag conditions. In slags with CaO/SiO_2 ratios under 2/1, increasing the basicity decreases K_{Mn} and thus increases the manganese in the steel. Further increases of basicity above a 2/1 ratio have no further effect on K_{Mn}, but when such increases are achieved by increasing slag volume, it is evident that the manganese in the metal will be lower than where a definite minimum slag volume of requisite basicity is maintained.

Sulfur is present in basic openhearth principally in combination with the basic oxides of calcium, magnesium and manganese. The reaction for sulfur is of the type:

$$FeS\ (metal) + CaO\ (slag) = FeO\ (slag) + CaS\ (slag).$$

This reaction would indicate that highly basic slags of low iron oxide content should be most effective in the removal and control of sulfur. This has been found to be the case in practice and most of the troublesome variations so often encountered from heat to heat can usually be explained by an interpretation of the slag-metal relations. Since there can be some sulfur pickup from the fuel, or some removal by the furnace gases, these features should also be considered. For a given furnace atmosphere, the tendency for sulfur removal by the gases is favored by a high concentration of sulfur in the slag. Thus the same highly basic conditions that favor retention of the sulfur in the slag also favor the removal of some of the sulfur by the furnace gases. Conversely, steelmakers are familiar with the potentiality of sulfur

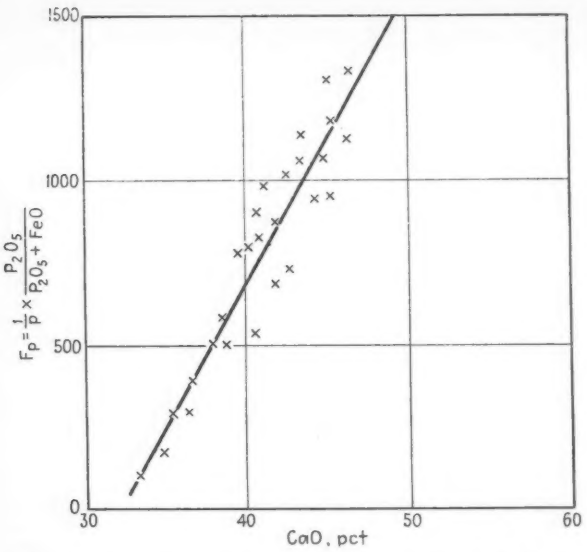

FIG. 11—Curve showng the effect of lime on dephosphorization.[13]

pickup when high sulfur fuels are used, particularly where the lime/silica ratio is low.

It would seem that the ideal conditions for sulfur removal would be attained if a highly basic fluid slag prevailed early enough in the heat to make use of the low FeO existing in the slag under such conditions. Such conditions are seldom achieved in practice.

Darken and Larsen[10] have listed the following factors as favorable to desulfurization; (1) large slag volume (specifically, a large number of moles per unit of slag), (2) high slag basicity, (3) high manganese in metal, and (4) low FeO in slag.

Grant and Chipman[11] have found that FeO in the slag in the normal openhearth ranges is of little importance, which would tend to indicate that the reaction for desulfurization given earlier is less important than the slag-metal distributions of the metal sulfides. These authors agree that the important factor for desulfurization is high basicity, and that CaO, MgO and MnO are chemically equivalent as desulfurizers.

Fetters and Chipman[1] show the relation between slag basicity, residual manganese and desulfurization tendencies, from a study of many openhearth heats in figs. 9 and 10. It is evident from the foregoing that the openhearth furnace is not among the most efficient or economic desulfurizing units.

The basic openhearth is more capable of controlling phosphorus content than it is of controlling sulfur. As in the case of sulfur, the phosphorus is considered to be retained in chemical combination in the slag, and also, like sulfur, the basic oxides of CaO, MgO and MnO are about equally effective when normal slag compositions are considered.

The reaction following is believed to express the chemical behavior of dephosphorization:

$$2P + 5O + 4\,CaO = 4\,CaO \cdot P_2O_5$$

Winkler and Chipman[12] have listed the following conditions as favorable to dephosphorization; (1) decreased temperature, (2) increased iron oxide content of slag and metal (note the generally low phosphorus content of highly oxidized low carbon heats), and (3) increased base-acid ratios of slag including CaO, MgO and MnO—see fig. 11[13] for a curve showing this general relationship.

So far as control of steel quality in practical openhearth operation is concerned, it is evident that a slag composition only basic enough to effect the required sulfur and phosphorus control need be considered. It is further evident that such a slag will be effective only when its major constituents are molten or in solution, and thus effective in chemical reactions involved. Slag volume is determined by the amount of lime required to take care of the silica resulting from the silicon in the charge, less the amount removed by a flush slag. One must not lose sight of the fact, however, that in order to remove a certain amount of sulfur or phosphorus, a more basic slag is required with low slag volumes.

Slag volume is of considerable consequence, however, in its effect on production rates. In two plants where slag control was not practiced, the lime charge was regulated so as to always insure a safe excess. The result was unnecessarily large slag volumes on all heats except those where the charged silicon was on the high side of the normal range. After a slag control practice was instituted in these plants, the lime consumption was reduced markedly, with consequent reduction in slag volume. Increased production rates were achieved with no other changes in practice; fig. 12 shows these results graphically. The production rates are given as *R* values where:

$$R = \frac{\text{Tons steel per hr x 100}}{\text{Heat size in tons}}$$

This value has been found a good basis for comparison of production rates of various furnace sizes.

Slag Control Methods

It is evident that ideal conditions for slag control would exist if the exact composition and amounts of all materials entering the furnace during the course of a heat were known. In such a case it would only by necessary to make appropriate additions of lime to balance the acid oxides present—the problems of slag control would be nonexistent. In practical operation it is not possible, however, to determine with sufficient accuracy the amounts of acid oxides (SiO_2 and P_2O_5) entering the furnace, and about the best compromise is to make the best possible estimate of the lime content that will be required, and then to rely on corrective additions during the working of the heat to maintain the desired slag compositions.

Since silica is the principal acid oxide and since the chief source of silica is the oxidation of the silicon in the hot metal, it is usually possible to approximate the composition of the hot metal from previous cast and mixer test analyses at the time the limestone for a heat is being charged. Many plants charge limestone based on a chart relating the desired slag basicity to the amount of hot metal, its composition, and the corresponding number of boxes of stone to be charged. For maximum production rates and the highest degree of control, the aim should be to charge a slight deficiency of lime and to make the necessary corrective additions as early in the heat as possible. In cases where the iron composition may be swinging, it may be necessary to charge a slight excess of stone

to be on the safe side and to avoid the necessity of very large lime additions during the working period. Suitable corrections may be determined for shops using ore charge-flush slag practice. Slag control, as generally practiced, is the approximation of the composition of the slag during the working period of the heat and the addition of the required amounts of lime (or in some cases, of sand) to adjust the composition to that desired. The principal differences in the methods of slag control in various plants lie in the means for estimation of slag composition. The time required for chemical analyses for lime and silica is prohibitive, so physical or chemical characteristics of the slags which are related to slag basicity are used as a basis for control.

Since slag composition is closely related to viscosity, measurements of viscosity have been made the basis of one rather elaborate system of slag control.[15] There are several examples in the literature of 10 or more years ago, where workers have tried to determine the free lime in slags by rapid chemical means, but none of these seems to have been successful enough to justify any considerable plant application.

There have recently been two papers[16,17] reporting the results obtained by determining the pH of a water suspension of crushed slags. These values show good correlation with the chemically determined CaO/SiO_2 ratio.

Some of the best plant results have been obtained using estimates of slag basicity based on the appearance of samples of slag. Finely crushed samples of slags show a definite series of colors based on composition and have been used as a basis for control. Slag pats are probably the most widely used visual method for estimating slag composition. If samples of slag are poured into cup molds or on a plate, the color, texture and general appearance of these pats can be related rather well with composition, and since the estimate may be made satisfactorily with a minimum of experience, such methods have found wide acceptance. The appearance of the pats is not too greatly affected by the presence of undissolved constituents, so it is probable that these pats give a better estimate of the effective slag composition than a full chemical analysis.

A series of slag pats covering the range of CaO/SiO_2 ratios normally experienced in an average basic openhearth heat, whether intended for a higher carbon killed-steel or for a low carbon rimmed-heat, is shown in part I. Those slags having dull bottoms, (shown in the top row of the photograph) are commonly known as basic slags, and those having shiny bottoms (lower row) are called acid slags. Identification in the caption of each of the individual slag pats is in terms of CaO/SiO_2 ratios and is uncorrected for P_2O_5 content. The authors feel that the omission of this correction is quite justifiable, since for a given shop, the P_2O_5 content will not deviate beyond the limits of practical slag control accuracy.

The slag display from which the photograph was made is in current use at a shop of Youngstown Sheet and Tube Co., and its use on the openhearth floor has served well to acquaint the operating personnel with the fundamentals of slag control through slag-pat examination.

It should be the aim of any shop practicing this type of slag control to charge a slight deficiency of lime, checking the basicity and condition of the slag

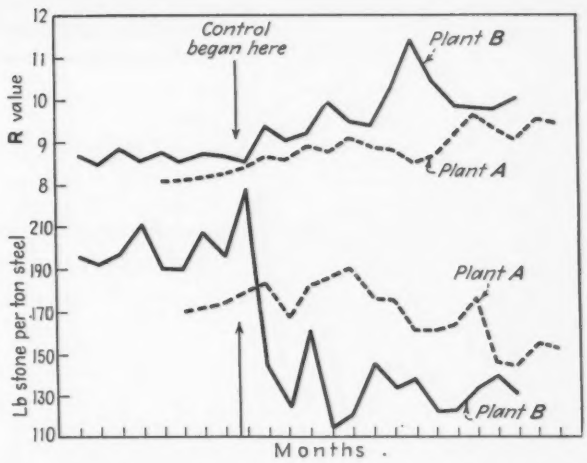

FIG. 12—Effect of slag control on production rate and on pounds of limestone required per ton of metallic charge.

by pats as the working progresses, and making the necessary additions as indicated, depending upon the type of steel being finished. Experience has shown that for the medium and higher carbon killed-steels, a V value of about 2.1 should be aimed for at tap. This assures sufficient phosphorus removal and still provides a minimum slag volume so important in maintaining maximum production rates. For the low carbon rimmed steels, a slightly higher tapping V value has been found satisfactory.

A furnace man, experienced in the use of these slag pats, is able to determine to a remarkably accurate degree, very early in the heat, the amount of additional lime necessary to reach a definite final V value. He accomplishes this by merely following the appearance of several progressive slag samples and estimating the amount of lime still down, either from experience or by feeling the furnace bottom. The modern furnace operator has learned that his safest practice includes the pouring of a slag pat at least as often as the carbon is checked.

In actual practice, assurance that these rudiments of slag control are thoroughly understood by the entire openhearth furnace personnel, should run as a corollary to a more thorough scientific knowledge of the physical chemical phenomena by the technical staff.

Summary

This article has presented a summary of the chemistry, mineralogy, control, and operating significance of basic openhearth slags. The following facts are pertinent:

The effect of slags on oxidation of steel is less important than was generally considered a few years ago. The principal control of bath oxidation is the carbon in the steel and the best estimate of the iron oxide in the bath for control of deoxidation additions may be determined from the established carbon-oxygen relation, unless one is prepared to analyze for oxygen directly.

Production rates are closely related to slag volume, and since slag volume increases with increasing slag basicity, the optimum conditions are achieved when

the slag is just basic enough to permit the required control of phosphorus and sulfur. Sulfur and phosphorus removal and control are closely related to slag basicity, the removal of both being favored by increasing basicity.

All slag control methods are based on the best possible estimate of the composition of the furnace charge and the use of the amount of lime necessary to give the desired basicity based on this estimate. In plant operation it is necessary to make corrective additions during the working of the heat, and one of the best bases for these corrective additions is slag composition as judged from visual examination of slag pats.

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[15] C. H. Herty, Jr., "Slag Control," U. S. Patent No. 2,228,566, January 1941.

[16] W. O. Philbrook, A. H. Jolly, Jr., T. R. Henry, Trans. AIME, Vol. 162 (1945), p. 49.

[17] M. Tenenbaum, C. C. Brown, Trans. AIME, Vol. 162 (1945), p. 60.

Production of Alumina From Clay

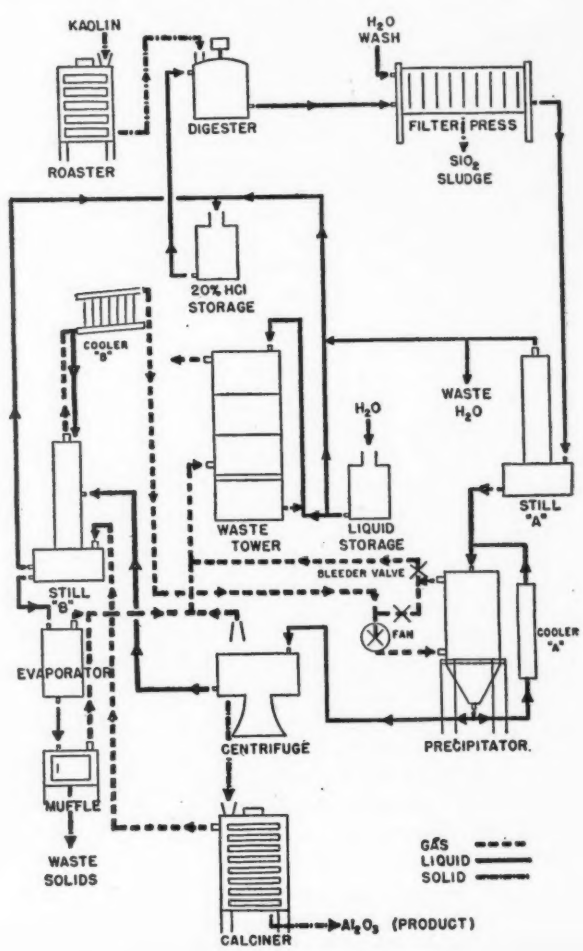
DEVELOPMENT of a process for the extraction of alumina from clay and construction of a pilot plant, is described in a research paper, RP 1756, entitled, "Development of a Hydrochloric Acid Process for the Production of Alumina from Clay," by J. I. Hoffman, R. T. Leslie, H. J. Caul, L. J. Clark and J. D. Hoffman, published in the *Journal of Research of the National Bureau of Standards*, December, 1946. ....

The process can be summarized briefly by referring to the flow sheet, at right. Raw kaolin enters the roaster, then passes to the digester containing hot HCl. From the digester the sluory goes to the filter press where the insoluble matter, consisting largely of SiO_2 sludge, is removed and discarded. The acid solution passes to still *A* where waste H_2O is removed, and some dilute hydrochloric acid is thrown back into the "20 pct HCl storage" reservoir, later to be returned to the digester for decomposition of more kaolin. From still *A* the concentrated solution goes to the precipitator where $AlCl_3.6H_2O$ is precipitated by coming in contact with HCl gas. During saturation with HCl gas the solution is cooled by circulation through cooler *A*. From the precipitator, the aluminum chloride, suspended in a solution saturated with HCl, goes to the centrifuge where the aluminum chloride crystals are removed. From the centrifuge the crystals go to the calciner, which converts the chloride to the finished product, Al_2O_3, and liberates HCl, part of which condenses in the cooler *B;* the rest is absorbed in the precipitator tower after having been cooled in the cooler *B*. HCl gas for precipitation of $AlCl_3.6H_2O$ from still *B* is pulled through the cooler *B*, and is circulated through the precipitator by the fan. The bleeder valve serves to regulate recirculation of unabsorbed HCl and to eliminate air and other gases through the waste tower. The HCl solutions which are stripped of their gas in still *B* to supply the precipitator come from three sources, namely, (1) the filtrate from the centrifuge, (2) strong HCl built up in the process, and (3) makeup acid.

After the filtrate from the crystals of aluminum chloride leaves the centrifuge and has been stripped of its available HCl gas in still *B*, a part of the residual solution is concentrated to a slurry or cake in the evaporator, the dry or nearly dry residue is ignited in the muffle, the acid is recovered by absorption, and the solids containing the impurities are discarded as waste solids. The remainder of the stripped solution in still *B* goes back into the 20 pct storage tank for reuse. The amount of the impure residual solution from still *B* that goes to waste solids is greater with clays containing large amounts of impurities than with very pure kaolins, and is the means of eliminating impurities.

All gases emerging from absorption towers pass through the waste tower to catch any unabsorbed gases. The whirling of the centrifuge always liberates some HCl gas from the saturated solution. This gas likewise is piped to the waste tower.

The process is feasible, according to the report, but the cost of producing alumina from clay under present conditions is probably 50 pct higher than by the usual Bayer process applied to high grade bauxite.

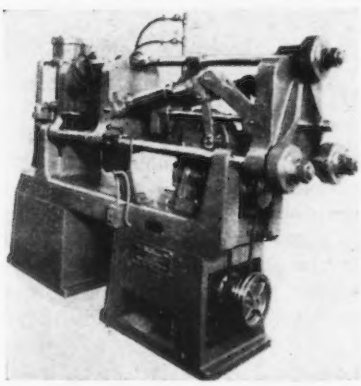


New Equipment . . .

Foundry Equipment and Supplies

Diecasting machines, several types of melting furnaces, sand conditioners, a sand moisture meter and other foundry equipment such as pattern plates and metal purifiers are described in this week's digest of announcements.

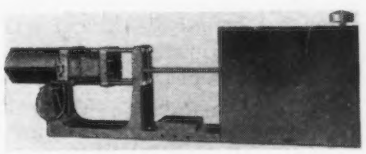
1 An improved model of its fully automatic, high-speed, low-cost diecasting machine for production of zinc, lead and tin castings has been announced by *Light Metal Machinery, Inc.*, 736 Penton Bldg., Cleveland. Between cycle delays are eliminated by a cycling mechanism that provides for automatic die movement, shot and ejection in continuously repetitive cycles. Once the machine's cycling rate has been selected and set, operator proficiency has no effect on the production rate. The operator merely fills the melting pot and lubricates the die.



To provide for a wide range of casting sizes, the machine may be operated at any one of four fixed speeds: 240, 330, 520 and 720 shots per hr. Shot capacity is 16 oz with a casting area of 30 sq in. Die changes are said to average 15 min for complete change and setup.

Cold Chamber Diecaster

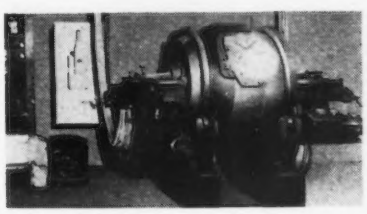
2 Designated Model HD103, a high-speed cold chamber injection diecasting machine with center gate for casting aluminum, magnesium and brass alloys has been announced by the *H. L. Harvill Mfg. Co.*, Corona, Calif. Provision is made for conversion to hot chamber operation for casting zinc, lead and tin-base alloys. The machine is basically a small, lightweight cold chamber type capable of casting up to 2.6 lb of aluminum, or a proportionate volume of other base metal alloys, at a maximum production rate of 500 shots per hr. It has been designed for high-speed low-cost casting of small to medium sized parts. Specifications provide



for normal die dimensions of 13½ in. vertical x 23 in. horizontal with a dimension of 10 in. between dies in the open position and a maximum thickness of the dies when closed of 19 in. The injection piston has a diameter of 4 in. with a stroke of 13 in. Operating under 1000 psi oil hydraulic pressure, a pressure of 5000 psi is applied on the molten metal injected into the die cavity. Controls are semiautomatic finger tip, with automatic time cycle adjustments of die opening and closing and foot switch injection control.

Electric Furnace

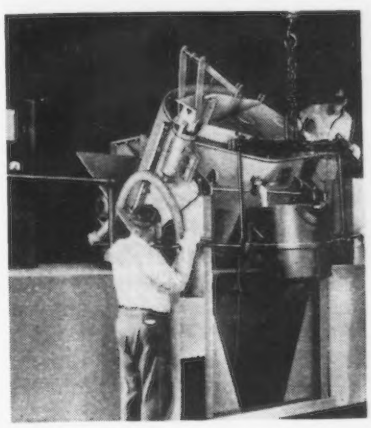
3 Addition of an indirect arc rocking electric furnace which will melt up to 900 lb of bronze or 500 lb of cast iron per hr has been announced by the *Detroit Electric Furnace Div., Kuhlman Electric Co.*, Bay City, Mich. This model, known as the Type LFN and rated 150 kw with 500 lb nominal cold charge capacity, has the Detroit rocking ac-



tion which produces automatic stirring and helps to insure metal of uniform quality. It is available with attached electrode brackets and mechanical automatic electrode control, or pedestal mounted electrode brackets with automatic hydraulic control as illustrated. All melting factors, including melting time, and composition, can be controlled by one man.

Induction Melting Furnace

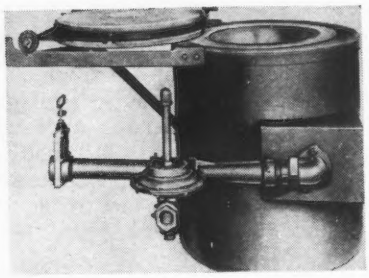
4 Operating on the twin coil induction principle, a 125 kw induction melting furnace for aluminum and aluminum alloys has been announced by *Ajax Engineering Corp.*, Trenton, N. J. Finely divided aluminum alloy particles like turnings, chips and unbaled foil can be



melted in this furnace. It is claimed that oxidation losses are reduced considerably, and that yields of 95 to 96 pct of the dry weight of the charge are obtained with this unit, in view of the rapid melting and the low temperature prevailing in the hearth during the melting operation. Furnaces can be connected to standard frequency power lines of 60, 50 or 25 cycles. The pouring spout is located in line with the rotating axis of the furnace, making it easy to adapt them for direct pouring into molds. Tilting is accomplished by a hydraulic ram with a flexible chain. Electric controls are concentrated in an internally wired selfcontained control cubicle, which also houses the temperature control instrument.

Crucible Furnaces

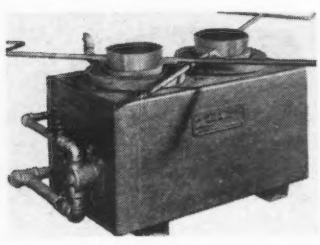
5 Two series of gas-fired crucible furnaces have been offered by *Eclipse Fuel Engineering Co.*, Rockford, Ill. RB series stationary crucible furnace has been designed for heavy foundry production in the melting of brass, bronze, aluminum and other alloys. The SB series



furnace has been planned for similar purposes, but incorporates the HE entrainment burner, which maintains a constant air-gas ratio over wide turn-down range. This permits a fast melt-down when required, with the ability to maintain a very low input, in case holding temperature is needed. The SB type also has swing back cover. Both types employ heavy sheet-steel shell construction and highest quality refractory material linings.

Aluminum Melting Furnace

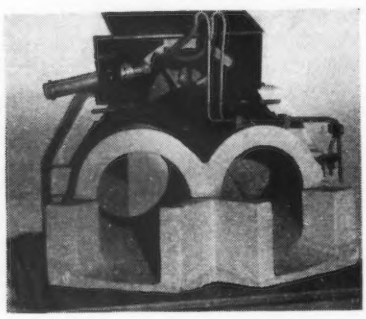
6 For the moderate production needs of pattern shops, smaller foundries and other plants, and as supplemental equipment for large foundries, an aluminum melting furnace has been announced by *Kindt-Collins Co.*, 12651 Elmwood Ave., Cleveland 11. Aluminum can



be melted in and poured directly from the heat-resisting alloy metal pot. This minimizes agitation and resultant porosity. The pots, which can withstand more than 100 heats, are designed to keep gases away from the surface of the molten metal. Fuel and air adjustments are said to be easily made and furnaces are insulated to assure maximum heat. They are pilot-equipped for quick and easy starting, and provide quick melting with low fuel consumption. Single units have a capacity of 50 lb; double units, 100 lb.

Reversing Valve

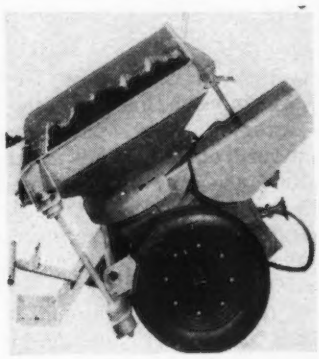
7 Introduction of a new type reversing valve for heating furnaces and small melting furnaces has been made by *Blaw Knox Co.*, Pittsburgh. Features of the unit include compactness, with special adaptability for low headroom conditions, and simplicity of design and operation to reduce maintenance. Constructed with straight flow lines for the passage of the gases, the valve has only one moving part for complete reversal of air and waste gases. A swinging damper hollowed for the passage of air and turning about an axis central with the air port, alternately connects the air intake port to each of two



waste gas ports. All three ports are formed in an integral seat casting, which is water cooled to withstand the high temperature. The unit is suitable for use with either natural or fan blown air.

Sand Conditioner

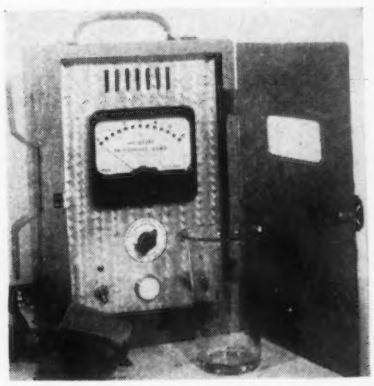
8 Announcement has been made of an improved portable model M Screenarator that cleans, cuts, screens, double-aerates and blends sand for production foundries and job shops. Made by the *Beardsley & Piper Co.*, 2540 North Keeler Ave., Chicago 39, it is suitable for large and small foundries because of its ability to quickly produce a flowable, easily rammed sand. This new model has a redesigned motor of more rugged construction and simpler design. The main frame is redesigned and simplified, with a brace from the frame fitting on the wheels to lock them, thus eliminating movement of the machine when in operation. The handle is now retractable and so located that the machine can be moved forward without going around to the opposite end. The Screenarator is electrically operated and when positioned for use, its low height and resting angle



is said to make shoveling easy. Conditioned sand may be discharged as far as 25 ft and elevated from 2 to 10 ft depending upon the operator's requirements.

Moisture Meter

9 A moisture meter for determining moisture in foundry sand has been developed by *J. Thos. Rhamstine*, Harlingen, Texas. The instrument is said to provide instantaneous and constant reading—as many as 15 readings per min may be obtained, and when set to a definite moisture percentage, these readings are accurate to within ¼



pct, it is said. Two separate systems are incorporated in the one instrument: one, where, with certain types of sands, the meter may be used direct without being attached to ac lines; the second system is amplification of the primary readings, where the control or corrector may be used to set the meter

needle to correspond to the scale figures. Accuracy can be maintained and the curve of moisture in percent, if so set, will follow the scale for one type of sand. Molding sands and core sands are capable of giving appreciable deflections by the direct method, it is reported.

Pattern Plate

10 Known as the Master Cast and Ground Flat Aluminum Tuff Plate, a new type of pattern plate has been announced by the *Kindt-Collins Co.*, 12651 Elmwood Ave.. Cleveland 11. A group of tough knurled steel inserts, cast integrally into each plate, are so placed around the outside perimeter as to effectively distribute and equalize wear at flask contact points. Because of their hardness, these inserts reduce the wear by flasks to a minimum, it is said, and greatly increase plate life. The surface of the plate is especially machined to prevent sand slippage and the entire plate is accurately ground to a ±0.003 in. A 1-in. allowance all around is made for the flask strip, with 3-in. standard ears at each end to accommodate all types of flask-pin guides. The edges are rounded for easy handling.

Metal Purifier

11 Uni-Flux, a metal purifier for aluminum, brass, copper and gray iron, has been announced by *United Flux Corp.*, 3608 Euclid Ave., Cleveland. It is said to increase metal recovery, reduce melting point and does not attack the lining of furnace or pot. By forming a covering over the molten metal, it reduces volatilization and prevents oxidation of the metal. Uni-Flux is said to reduce heating by 20 to 30 pct, makes skimming easy, permits free flow pouring, and eliminates dross and porosity. It can be used in crucible electric or open flame furnaces.

Melting Pot

12 A 50-lb capacity melting pot for aluminum, white metal, zinc, etc., which has been scientifically designed and heavily constructed, has been announced by the *Kindt-Collins Co.*, 12651 Elmwood Ave., Cleveland 11. Cast from special alloy, the vessel has been normalized to prevent cracking and 200 heats can be obtained from each pot under reasonable care. Use of a 2-man bale permits pouring of metal from the same pot in which it was melted, thus minimizing agitation and reducing porosity.

New Engineering Materials

Wire screen, metal-plastic sheets, free machining die steel, stainless channels, nickel alloys, refractory materials and adhesive cements are some of the engineering materials featured in these pages.

Wire Screen

13 Lektromesh has been made available to industrial users of metal screening and filter cloth by *C. O. Jelliff Mfg. Corp.*, Southport, Conn. It is a one-piece solid metal product, with no woven or other foundation structure; it cannot ravel and is extremely resistant to tearing. The product supplements rather than competes with woven wire and is most applicable in the finer sizes beyond the limits of perforated metal, and where applications differ from those of woven wire of comparable mesh size. Hole diameters are extremely accurate and the screen presents smooth surface finish equal to that of perforated mesh. It is stiff, strong and wear resistant, said to be readily fabricated by drawing, stamping, welding, soldering, and other secondary operations. A wide variety of mesh patterns can be produced in various metals. Meshes produced vary from 40 to 400 mesh.

Metal-Plastic Sheet

14 Known as Miramesh, a metal-coated, plastic sheet having a mirror-like finish in either gold or silver color has been announced by the Vacuum Engineering Div., *National Research Corp.*, 100 Brookline Ave., Boston 15. The basic material for Miramesh is Vimlite produced by the Celanese Plastics Corp. The material is a Saran screen which is filled by a cellulose acetate film. In general, Miramesh can be handled by the same processes and used for the same applications as Vimlite. On one side of the base material a thin film of aluminum is applied, providing stability, resistance to tarnishing, high reflectivity and brilliance. A protective lacquer is applied over the metal finish; clear in the case of the silver finish and gold colored for the gold finish. Other metallic colors can be obtained on special order. Miramesh, which can be stitched or cemented, is especially acceptable for decorative purposes, for radiant heat reflectors, light diffusers, and in numerous other industrial fields.

Stainless Channels

15 Addition of stainless steel channels to its regular lines of stainless steel ingots, billets, bars and shapes has been made by the *Joslyn Mfg. & Supply Co.*, Fort Wayne, Ind. The product was developed as a companion item to the company's stainless steel angles and has broad application in metal fabricating. Channels are produced hot-rolled, annealed and pickled in AISI types 302, 304 and 316. Sizes are from ¾ x ⅜ x ⅛ in. to 2½ x ⅝ x ¼ in. in any length desired. They have attractive finish, high tensile strength and great resistance to corrosion and heat.

Free Machining Die Steel

16 Speed-Cut, a die steel produced by *Vanadium-Alloys Steel Co.*, Latrobe, Pa., is made with a composition that has proved successful for plastic molds and for diecasting dies for white metal alloys. A feature of this steel is its free machining quality, which permits hardening the steel prior to machining. The steel is furnished in the annealed state or heat treated within the range of 250 to 325 Bhn, as specified. Speed-Cut is said to machine as readily at 300 Bhn as other steels used for the same purpose in their annealed state. Its hardenability provides air hardening properties capable of producing a hardness of 300 Bhn or higher even in very large sections. A still higher

hardness can be obtained by oil quenching and little or no movement is said to result from treating. Speed-Cut is a homogeneous steel that does not depend on high sulfur or nonmetallics for its free machining qualities, so that high surface finishes are obtainable from polishing.

Nickel-Base Alloys

17 Development of two corrosion-resistant metals, Chlorimet No. 2 and No. 3, has been made by the *Duriron Co., Inc.*, Dayton 1. These high-strength nickel-base alloys have been added to the list of Duriron, Durichlor, Durimet and other special alloys produced by the company for various types of corrosive service. Chlorimet No. 2 consists primarily of nickel and molybdenum, these two elements combining to give an alloy with excellent mechanical properties and resistance to the corrosive action of many acids, particularly hydrochloric in all concentrations and temperatures, including boiling. Chlorimet No. 3 consists primarily of nickel, chromium, and molybdenum. Its similarity to No. 2 is that 50 pct of the molybdenum content has been replaced by chromium. The alloy has excellent mechanical properties and unusual resistance to most acids, particularly under oxidizing conditions. Chlorimet No. 2 and No. 3 are available in the form of engineered equipment such as pumps and valves.

Refractory Materials

18 Announcement of a hydrogen-reduced molybdenum powder of highest purity and very fine particle size has been made by the *Indar Corp.*, 910 E. 23rd St., Indianapolis. In addition to molybdenum powder, developments on tungsten carbide powder have resulted in a product which is extremely low in free carbon and has a small particle size. This powder is suited for the manufacture of carbide cutting tool materials and similar applications. Tungsten carbide powder premixed with any desired proportion of cobalt, to give a homogeneously blended mixture, is also available from the company.

Adhesive Cement

19 A synthetic, waterproof adhesive said to be more resistant to oxidation than similar natural rubber compounds has been announced by the *Du Pont Fabrics Div.*, Fairfield, Conn. The cement is recommended for bonding Buna-N type synthetic rubbers and vinyl films or sheet stocks to rigid surfaces such as steel, aluminum, glass, wood, or concrete. Designated as No. 5118 Fairprene adhesive cement, the new adhesive is a thermoplastic synthetic elastic composition that does not require vulcanization to obtain maximum adhesive strength. Oils or straight gasoline will weaken the bond strength slightly; aromatic hyrocarbons will destroy it. It is unaffected by temperatures as low as 40°F; strength is weakened at temperatures of 160°F. Cold-setting, the adhesive will dry to a tacky surface, under average conditions, in 3 to 10 min, and dry completely within 2 hr.

Disk Cement

20 Having strong adhesive powers in addition to being easy to apply and to remove, a disk cement, known as Master Disc Cement, has been produced by *Kindt-Collins Co.*, 12651 Elmwood Ave., Cleveland 11. It is used for applying cloth-backed and flexible paper disks to steel disk-grinding machines. It is not designed for heavy-baked fiber-backed disks. Only a few minutes are required for removing worn disks and applying new ones when this cement is used. Because of its uniform, high-adhesive properties, the cement holds the abrasive disk tightly to the entire face of the metal disk, assuring grinding accuracy. The cement is put up in quart cans only.

Silicone Resin

21 DC 2103 is a thermosetting resin developed and produced by *Dow Corning Corp.*, Midland, Mich., for use as a heat-stable bonding material for inorganic fabrics in the production of rigid electrical laminates; and for bonding finely divided particles such as powdered metals or mica, silica or carbon. DC 2103 has high heat stability, very low water absorption, excellent dielectric properties over a wide frequency range and resistance to carbon tracking. It is an organo-silicon polymer material built on an inorganic skeleton of alternate silicon and oxygen atoms. Its unique properties are due largely to the inherent stability of this inorganic skeleton. Without the addition of a catalyst, this solution, which is 60 pct silicone resin in toluene, air dries in about an hour at 77°F and 50 pct relative humidity depositing the resin in a hard, and tack-free form which has an initial melting point of 158°F. Transition to a liquid state is quite sharply defined and the melted resin is very fluid.

Polishing Wheel Adhesive

22 A new grain cement and thinner has been added to present day plating supplies by the *Hanson-Van Winkle-Munning Co.*, Matawan, N. J. This material is an improved adhesive for polishing wheels which is said to overcome the deficiencies of organic glues. It has been used in the field with success, it is reported. Wheels must be dry before applying the material, which has been thoroughly mixed, before pounding and working the grain into the wheels.

Miniature Conveyors

23 Huge, complex belt conveyor systems can be duplicated in exact miniature, *Goodyear Tire & Rubber Co.*, Akron, Ohio, have announced. They are constructed to 1/16 scale and powered by a small motor, 60 rpm, with minute parts used to reproduce in miniature all types of belt conveyors. Equipment includes idlers, framework, belting, counterweights and a small stand of tires to cushion the loading impact. Such mechanism is said to be ideal for engineering research, for testing new belt designs, sales demonstrations and as visual aids in training field representatives.

Scale Models

24 The Triometric System of plant logistics, namely, the science of arranging and laying out the production equipment to insure maximum economies, to insure faster production, increased safety, greater profits and reduced handling, is a proven, scientific method of complete engineering in miniature, to give a three dimensional preview of a plant's efficiency. *Triometric Engineering Co.*, 1157 Wolfendale St., Pittsburgh 12, has announced. The company offers precision cast metal scale models, molded for permanency and accuracy. Models, scaled ¼ in. to the foot, are so made that

they are readily distinguishable as representative of the actual machines or equipment. Two-dimensional templates are also available, which show all clearances required under extreme operating and service conditions of the machine proper, as well as pertinent data required by the planning engineer. Using the Triometric System various arrangements can be made quickly and easily, with great accuracy and by photographing these arrangements comparisons can be made. It is reported as much as 90 pct of the plant layout engineering costs can be saved by use of these precision scale models.

Changeable Ink

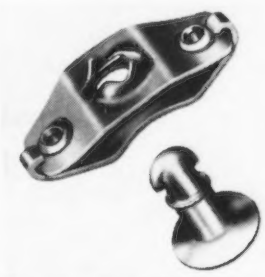
25 Called Hygroink, a liquid which, after drying, changes color with humidity has been announced by *Eljay Enterprises*, P.O. Box 891, Newark 1, N. J. Hygroink may be painted, sprayed or printed on paper, cloth, metal or similar surfaces or may be applied with a brush, pen, atomizer, spray gun, etc. It dries in a few minutes or less at any temperature from 110° to 150°F. After drying it is humidity sensitive, turning from blue-green to pink as the humidity changes. After being applied to paper slips or tabs Hygroink is ideally suited to check degree of moisture in rooms, containers, tanks, etc.

Fastening Devices

Recent developments in positive-locking and quick-operating fasteners, Monel and plastic rivets, rivet guns and stud welding equipment are covered in the following descriptions of fastening devices.

Positive Locking Device

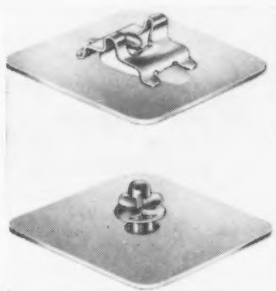
26 Developed to withstand extreme load strains and vibration, the spring locking fastener, a positive locking device designed to provide a quick, vibration-proof method of



joining plywood, plastic or metal products, is said to be the only cantilever spring locking fastener with a solid, one piece forged stud. This device, manufactured by *Lion Fastener, Inc.*, Rochester, N. Y., consists of two parts: stud and cantilever spring assembly. The stud, available with round, flush or wing head, is designed with shoulders forged in opposite sides to form the locking member. The cantilever type spring and base make up the spring assembly, a preassembled unit ready to install. Installation time is claimed to be short as there are only two parts to be spot-welded or riveted.

Quick-Operating Fastener

27 Designed for use on removable and hinged panels where accessibility for inspection, servicing or maintenance are prime requirements, the Q-Two fastener manufactured by *Shakeproof Inc.*, 2501 N. Keeler Ave., Chicago, is said to offer the advantages of a low first cost and minimum installation costs. The unit consists of three parts: a stud, special spring washer and receptacle. The stud is held to the outer sheet by the spring washer and the receptacle is snapped to dimpled inner sheets or frames.



Other features include allowance for variations in sheet alignment to 1/8 in., compensations for variations in sheet thicknesses, elimination of rivets and screws and positive locking with one quarter turn.

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

3/13/47

THE IRON AGE, New York 17, N. Y.

Circled below are items on which I request more information

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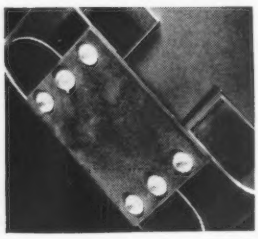
Plastic Rivets

28 Sturdy rivets made of Plexiglas, the transparent acrylic plastic, capable of being used in the fastening of light metals, leather, cardboard, rubber and other plas-



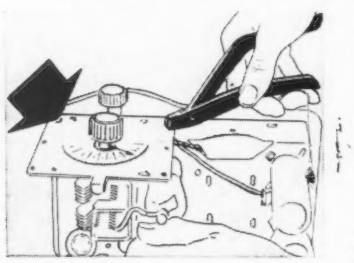
tics, have been developed by the *Douglas Aircraft Co.*, Santa Monica, Calif. When used on fragile materials, these acrylic fasteners can be clinched without shock by simply heating and expanding the rivets with air pressure of a spring loaded mechanism. After forming a strong, durable bond, the exposed parts of the rivet may be turned into novel decorative effects by further heat application. Both solid head and hollow shank rivets can be made by the new process. The heat-expansion method of insertion allows the shatter-resistant rivets to be used as blind fasteners where only one side of the assembly is accessible. Plexiglas rivets will not rust or corrode, and are available in a variety of colors. For applying the rivets in the bonding process, two models of combined air and heater guns are available.

Monel Blind Rivets

29 Blind rivets are now available in Monel metal as well as aluminum, brass and steel, according to the *Cherry Rivet Co.*, 231 Winston St., Los Angeles 13. Unusual combination of properties such as high strength, ductility and corrosion resistance which recommend Monel as a rivet material are pointed out. Because of these properties, the Monel rivet is a general purpose rather than a special purpose fastener. The rivet is identical in construction to other types manufactured by the company and is made in the self plugging and pull through hollow styles.

Blind Rivet Gun

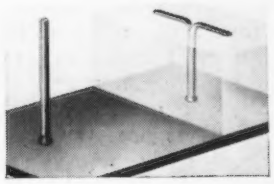
30 Added to the line of blind riveting tools manufactured by the *Cherry Rivet Co.*, 231 Winston St., Los Angeles 13, is an inexpensive light-duty blind rivet gun, the Cherry Jr. Riveter. This one-hand plierlike tool installs the rivet with



a simple pull. Blind rivets of the tight-clinching, pullthrough hollow type, 3/32 in. diam, provided in three grip lengths, are installed with the gun.

Split Studs

31 Split studs for securing insulation and similar materials to metal supports or surfaces with Nelson automatic stud welders have been announced by the *Nelson Sales Corp.*, Lorain, Ohio. The split studs which resemble cotter pins are welded to the support or surface at the rate of 100 to 200 per hr with the weld cycle entirely automatic, according to the manufacturer. Insulation is impaled on the project-



ing studs and the split ends are bent over to secure the material. It is said the studs can be used to secure rigid, semirigid or soft insulation, wires, metal lath, wire mesh and many other materials.

Stud Welding Equipment

32 Savings up to 50 pct in the cost of securing corrugated asbestos roofing and siding to steel frame structures are claimed by the *Nelson Sales Corp.*, Lorain, Ohio. Roofing or siding sheets are laid in position over the purlins or framing. Holes are then drilled in the sheet on predetermined centers over the purlins and threaded studs are welded to the purlins with the gun. Zinc nuts with soft lead washers are tightened over the studs, producing a weather tight seal. Lead headed self-tapping screws secure edges of lapped sheets between purlins. All work is done from the outside and it is said the speed of this process contributes substantial savings as well as eliminating interior scaffolding and reducing labor. Welding equipment consists of portable Nelson gun and automatic timer control which operate from a DC welding generator.

TIME-SAVER CARD for your convenience in obtaining, without obligation, more information on any one or more of the new equipment items featured on this and preceding pages.

3/13/47

THE IRON AGE, New York 17, N. Y.

Circled below are items on which I request more information

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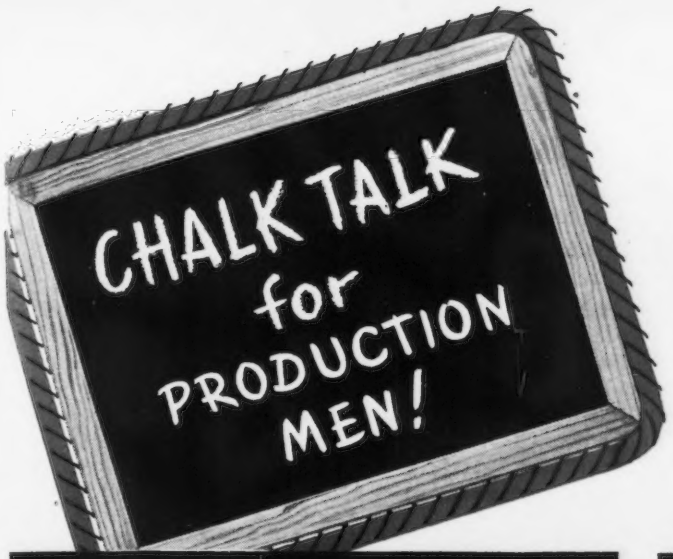
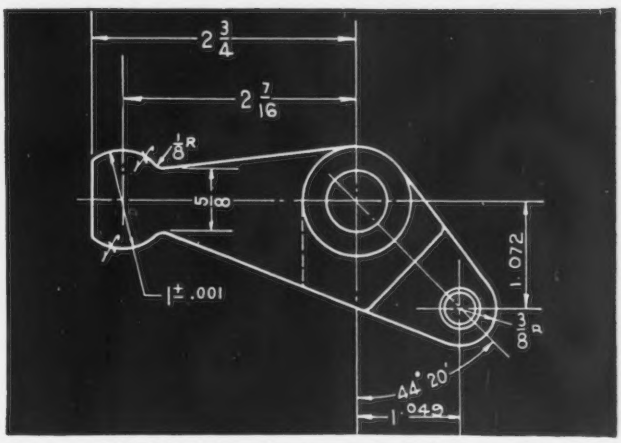
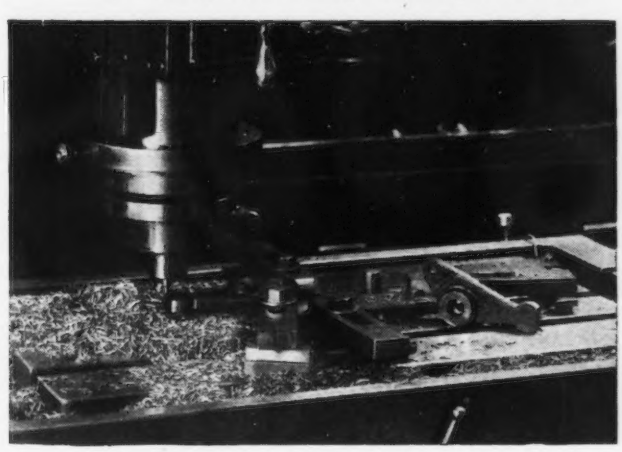


Cut Milling Time on this small part from 3¼ Minutes to 30 Seconds

1 **FAST!** The 1" dia. on the cam end of these malleable iron shifter levers was completely milled (ruff & finish) in 30 sec. each, floor to floor. Initial set-up took only 20 min. Old method of form milling took 3¼ min. Time saved is typical of Model 2D Rotary Head Milling Machine performance.



2 **DIRECT!** The simple radius of the cam end of the shifter lever was milled direct. A small end mill was the only tool used. Blueprint was the only guide operator had or needed. Precise mechanical control of the cutter in all angular and radial movements, a unique feature of the machine, did the rest.



3 **ACCURATE!** The single, simple set-up held chance for error to minimum. The built-in precision control and measuring devices for all combinations of cutting movements, angular and radial in both horizontal and vertical planes guaranteed uniform, accurate results.

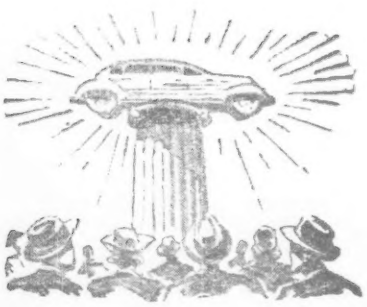
4 For more facts on how you can get FAST, DIRECT, ACCURATE results on other contour milling jobs, or on tool and die work, using the Kearney & Trecker Rotary Head Method, write for bulletin 1002C on the Model 2D Rotary Head Milling Machine.

KEARNEY & TRECKER CORPORATION
MILWAUKEE 14, WISCONSIN 4719

Assembly Line . . .

WALTER G. PATTON

• Freight car shortage hampering auto production . . . Tucker makes its debut in '48 . . . Chevrolet again leads in registrations.



DETROIT—Although little has been said about it the freight car shortage is hampering the automobile industry to a considerable extent and automobile executives are not overlooking the possibility that the railroad car problem may get worse before it gets better. To most observers here this result seems unavoidable as long as railroads continue to scrap more cars than they are able to build. Fortunately, the automobile industry can often drive away the finished product under its own power if necessary, and this fact plus its ability to use lake and river facilities will undoubtedly cushion any blow that comes as a result of the growing freight car shortage.

Foundries supplying the auto industry, for example, have often been hard put to obtain deliveries *on time* to augment their scant supplies of pig iron, sand, coke and scrap. Finished castings, particularly motor blocks, are nowadays often behind schedule in reaching their destination. According to some sources only the fact that most producers have built up substantial banks of motor blocks has prevented a number of plant shutdowns resulting from motor shortages. Both lean scrap and pig supplies and transportation difficulties have contributed to this result, they say.

The industry is feeling the freight car pinch in other ways too. Certain automobile components like wheels, frames, axles and tires are often delivered directly from box cars to assembly lines. Where regularity of freight car movements cannot be depended on, as is often the case today, car builders naturally have to find additional storage space to insure continuity of production. Under most circumstances, plant storage under a roof will not be available.

INBOUND raw materials are obviously more seriously affected by the car shortage than outbound finished cars since completed automobiles can, if necessary, be driven under their own power or transported in haulaways. Unfortunately, haulaway equipment, like railroad cars, has deteriorated badly during the war so that available capacity is being seriously overworked to take care of the present demands just as in the case of freight cars.

In prewar years, it is estimated that about 75 pct of all completed cars were transported by rail; the remaining 25 pct of the cars left the factory via haulaways or driveaways. The ratio is now reduced according to one automotive source to about 50 pct rail shipments and the remaining 50 pct driveaways or haulaways, thus doubling the load on the nonrail facilities and relieving the railroad burden by a corresponding amount.

Some relief is looked for by the automobile industry early in April when Lake shipping is scheduled to resume again. At that time steel shipments on the Great Lakes from Chicago, Conneaut, Ohio, Cleveland and Toledo will be resumed, thus reducing the amount of railroad shipping.

Commencing in April many cars and trucks scheduled for delivery to the southeastern part of the country will again be shipped from Detroit to Buffalo by boat. Others will go via water to Chicago while still other vehicles will be loaded on boats at Detroit for shipment to Duluth and subsequent delivery in the Northwest. Some of the present Lake transports, accommodate 600 cars, it is reported.

Another shipping method of the automobile industry which has increased in popularity during recent years is the use of river barges to deliver cars to the South and West. In most instances the cars are taken from Detroit to Cincinnati in haulaways, and there transferred to Ohio River barges which carry them down the Mississippi to Guntersville, Ala., or New Orleans. Shipment from these points to Florida and other Gulf States is usually by motor truck.

FULL page announcements this week in the *Wall Street Journal* and other papers heralded the official entry of the new "years-ahead" Tucker in the automobile sweepstakes of 1948. Advertised as the first completely new car designed for 50 years with completely "proved engineering," the Tucker advertisement explained that pilot models are now being built in Chicago, that preparations for tooling are being completed and that Tucker distributor and dealer franchises in some major cities have already been awarded.

Among the engineering features stressed in the advertisement are the use of hydraulic torque convertors at the wheels which eliminate both the conventional transmission and clutch, single disk aluminum brakes with "no adjustments to make . . . ever," weight distribution to give maximum safety, engine-in-the-rear, individual wheel suspension and a flat opposed six cylinder engine utilizing fuel injection.

Tucker had previously announced that the new car design would "eliminate 800 parts" from the conventional car. He has also said that the company is aiming at a daily production of 1000 cars—which is about the present Buick rate—and employment of 35,000 workers.

Without attempting to discourage Tucker's desire to offer the public a new and different automobile, Detroit engineers could see many obstacles in his path. For one thing, if the Tucker car is actually offered to the public as indicated, it would indeed be one of the most radically new designs ever to enter the automotive field, since it would combine in a single car, torque drive at the

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Labor's up! Material's up! Competition looms on both price and quality. Manufacturing survival and jobs depend on meeting it. What to do? Here's one thing . . .

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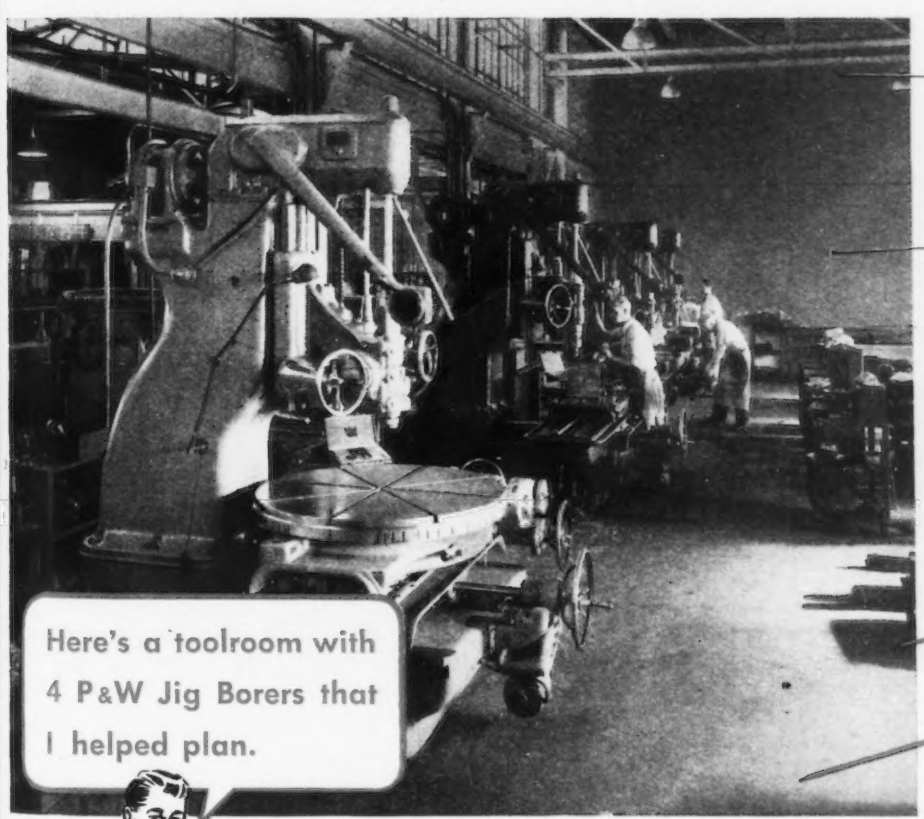
Write us a letter now, while you think of it, and also ask for your P&W Condensed Catalogue.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

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wheels, tubular frame construction and engine-in-the-rear—all revolutionary engineering changes. Remembering Chrysler's experience with its radical airflow design a few years ago and the fact that the new and different Kaiser has turned out to be a surprisingly conventional car from an engineering standpoint the industry can hardly be blamed for questioning the wisdom of incorporating in one car at one time so many radical engineering features.

SEVERAL major automobile producers have tried engine-in-the-rear designs but have later discarded them for a number of reasons including unsatisfactory weight distribution, expensive linkage control, engine cooling and car heating difficulties and the fact that adequate luggage storage space cannot be easily built into a rear engine car. While the use of an aluminum engine may minimize some of the weight distribution problems of the Tucker car, in the opinion of some of the industry's experienced engineers, a great deal of proving ground experience would be required to prove adequately just this one phase of the new Tucker design.

As one engineer pointed out, "Driving a passenger car with an engine-in-the-rear is quite a new experience to the driver who has accustomed himself to a motor up front."

An objection to the Tucker claims of adequate testing of engineering is that cars built for Indianapolis racing are designed to meet track conditions whereas privately-owned cars are designed primarily to suit the most fastidious and discriminating group of buyers in the world —the American automobile buying public.

Springs on Indianapolis racing cars it has been pointed out, are unusually stiff, for example, while the riding public has been clamoring for years for a "soft ride" which may require altogether different engineering.

Perhaps the foremost objection to be brought against the Tucker venture is the probable high production cost of a car of radical design. Even assuming that steel and copper are going to be available in adequate amounts and that necessary mechanical and electrical parts can be bought, the high cost of tooling will undoubtedly prove to be a severe handicap to any producer just starting up. If an argument is needed to support such claims, the present high cost of the Kaiser-Frazer cars seemed to offer an example.

Finally, a case had been cited by one prominent auto executive in which a U. S. manufacturer attempted to duplicate in Canada the production of a popular American-made car. Using the same drawings, the same dies and often the same supervision, 5 years were required before the Canadian plant was able to duplicate satisfactorily the American-built car.

"If any demonstration of the cost in time and money to acquire 'know how' in automobile production is needed," this executive asserted, "Here it is. While I wish Tucker the very best success, I am reasonably sure after 20 years in the auto game that to succeed he will need plenty of luck and more foresight than I've seen in the industry for many years."

NOW that final registration returns are in it appears that Chevrolet, by virtue of a tremendous spurt in December, has nosed out Ford to lead in new passenger car registrations for the eleventh time in the past 12 years, during which automobiles have been produced. The final passenger car count for 1946 as compiled by R. L. Polk shows total Chevrolet passenger car registration exceeding Ford by 2779 units.

Chevrolet's terrific finish is indicated by a comparison of the monthly totals during each of the past 5 months for Chevrolet and Ford:

New Passenger Car Registrations—1946	Chevrolet	Ford
August	38,412	37,058
September	43,292	37,546
October	41,516	41,871
November	46,814	38,323
December	73,366	39,208

The final count shows that Chevrolet led in trucks by 40,149. Of the 501,219 Chevrolets registered during the year passenger cars account for 329,601 units and trucks for 171,618.

In view of the fact that GM was strike-bound during the first 3 months of 1946, Chevrolet's showing is remarkable in many respects. However, with greater production capacity than Ford and the entire GM empire to draw on, it would not be surprising to find Chevrolet outproducing Ford in a normal year's operations.

What surprised most observers here was the final result of the new passenger car registration race since Ford at the end December had what seemed a commanding lead of more than 30,000 units over Chevrolet.

Survey Shows Detroit Output Set Many New Records in Past Year

Detroit

• • • **Statistics compiled** by the Detroit Board of Commerce show that all-time highs for this city were recorded in 1946 in industrial output, hourly wages, retail sales, bank savings deposits, births, population and man-hours lost on account of strikes.

Sales of department stores exceeded 1941 figures on a dollar basis by 68 pct and 1940 by 104 pct, the magazine *Detroiter* said.

Bank savings deposits reached $865,399,000, exceeding by $57 million any previous year.

Total factory payrolls for 1947 have been estimated at $1,300,000,000. This estimate is based on a 40-hr week at wage rates prevailing the latter part of 1946 which, the publication asserts, will yield $56.70 for factory workers.

Worker's earnings averaged $1.38 per hr in Wayne County factories last year, the Board of Commerce said.

Detroit lost 40 pct more man-days in 1946 because of strikes than ever before in its history, the statistics revealed.

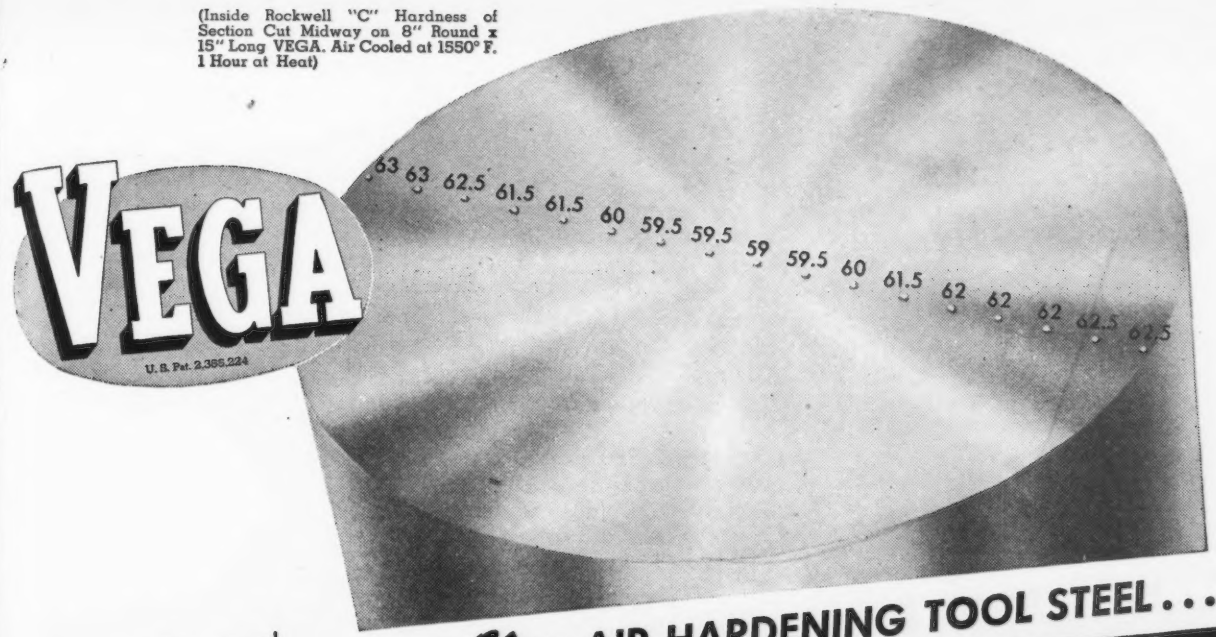
The city's population increased from 1,685,000 in 1945 to 1,770,000 last year, it was estimated.

The cost of living index for Detroit rose 8.7 pct during 1946.

According to the Board of Commerce: "This rise was matched by an approximately equal average increase in hourly factory wage rates, but hours worked per week were 11.5 pct less than in 1945."

The Board of Commerce estimates that the purchasing power of the average Detroit worker's weekly pay envelope was 14.5 pct less in 1946 than in the preceding year, although the amount of goods and services that could be purchased with an hour's wages were about the same for each year.

(Inside Rockwell "C" Hardness of Section Cut Midway on 8" Round x 15" Long VEGA. Air Cooled at 1550° F. 1 Hour at Heat)



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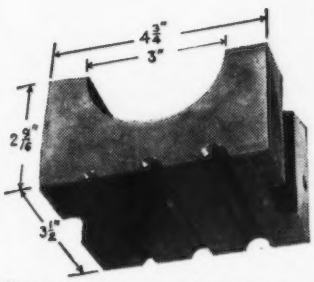
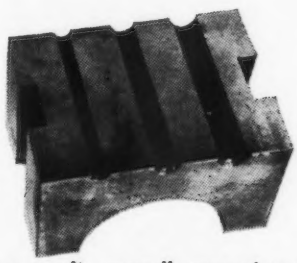


These chucking and forming dies, first made from an oil-hardening tool steel, "opened-up" .030"/.035" across the 3" diameter. To get minimum distortion in heat treatment, the tool maker changed to VEGA.



As a result, over-all expansion was held to .0004"/.0005"—with no evidence of warpage. And in the tool maker's own words, "VEGA machined in every respect as well as the oil-hardening tool steel previously used."

Hardening uniformly in very heavy sections from only 1550° F., VEGA cuts heat treating costs—makes special high temperature furnaces unnecessary. Its lower hardening temperature often enables you to eliminate expensive pack hardening to avoid excessive scaling. Moreover, VEGA gives you minimum distortion and size change, good machinability, resistance to decarb, freedom from excessive scaling and excellent toughness with good hardness.

Put VEGA's many advantages to work today on jobs such as blanking, piercing, trimming and forming light and heavy-gauge sheet metal. And for more information on its easy heat treatment and use, ask for the new VEGA folder. A note on your company letterhead, indicating your title, is all that's required.

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Washington . . .

L. W. MOFFETT

• President's compromise reciprocal tariff program generally hailed as constructive . . . Accepted proposals of two Republican Senators as means of avoiding Congressional log-rolling.

WASHINGTON — President Truman's executive order outlining procedures for the Administration of the Reciprocal Trade program is highlighted by its partial acceptance of the Vandenberg-Millikin proposals. These Republican Senators, the former from Michigan and the latter from Colorado, did not want to throw the tariff issue into a Congressional brawl, as was the practice before the Reciprocal Trade Agreement Act was passed. At the same time, they wanted adequate protection for American industry and labor with costs and wages much greater than those of other countries.

Hence, the President agreed with the Senators' request that the Tariff Commission hold public hearings to receive complaints by industrialists who may think tariff cuts have been too sharp or should not have been made at all. The Commission would make recommendations to the President who could accept or reject them. If the Commission found cuts would cause serious injury to American industry it would recommend that the concessions be withdrawn or modified.

This could be done under the so-called escape clause which is now incorporated in some agreements but will be embodied in all agreements hereafter. Senators Vandenberg and Millikin had proposed such a protection and it was accepted some time ago. An important part of the Vandenberg-Millikin proposal that was not accepted would have required a Tariff Commission finding in advance of negotiated concessions.

These protective measures clearly reflected not only a desire to prevent tariff log-rolling in Congress but also a fear, widely expressed by Republicans in Congress, that the State Dept. and other negotiating agencies will agree to too great concessions that will injure business and will not withdraw or modify them except through Presidential order. Some industrialists maintain that the President is not likely to issue many such orders.

There is also skepticism that the Tariff Commission will recommend that concessions be withdrawn or reduced. They point to inaction in the past in failure to apply the anti-dumping clause on cheap goods sold in the United States at less than their home market value. The American steel industry complained strongly that Belgian steel was produced and shipped into American markets at prices the domestic industry could not possibly meet without reducing wages and other costs. To a lesser degree the same charge was made regarding German steel.

DEPENDING upon whether the Administration is for or against a protective tariff, so it is charged, escape clauses, anti-dumping provisions and other penalties do have or do not have any value. It is maintained that recommendations will be turned to the Administration view or if they are not they will be turned down.

Fears that Tariff Commission procedure will not carry much weight, protective tariff Republicans in Congress have said, were given strength by Undersecretary of State William L. Clayton at a press conference that followed the issuance of the President's order. Mr. Clayton declared that concessions made by this country at the Geneva conference in April would not be subject to review by the Tariff Commission before becoming effective, such as Senators Vandenberg and Millikin had proposed.

Subsequently, however, it is assumed that the Tariff Commission would review all concessions negotiated. The Commission will keep informed concerning the operation and effect of provisions relating to duties or other import restrictions of the United States in old and new trade agreements. Once a year it will submit to the President and to the Congress a factual report on the operation of the trade agreement program.

Despite the fact that their proposal was accepted only in part the two Republican Senators welcomed the President's order "as a substantial advance in the legitimate and essential domestic protection which should be part of an equally essential foreign trade program." They added, however, that with respect to the proposed Geneva negotiations for a new world trade organization, they would reserve their position and judgment until the completed agreement is submitted for constitutional approval.

Procedure under the new program is quite complicated and appears to be bound up in considerable red tape. After outlining Tariff Commission duties, the order provides that an Interdepartmental Committee on Trade Agreements will be the agency from which the President will seek advice before concluding a trade agreement. This committee will consist of a commissioner of the Tariff Commission and of persons designated from their respective agencies by the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Secretary of Agriculture, the Secretary of Commerce and the Secretary of Labor. A representative from the State Dept. will be chairman of the committee.

DUTIABLE import items selected by the Committee for inclusion in a trade agreement will be analyzed by the Tariff Commission respecting such matters as production, trade and consumption. The analysis will be submitted in digest to the Interdepartmental Committee. Except when they are

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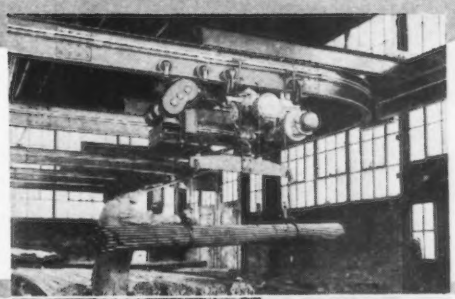
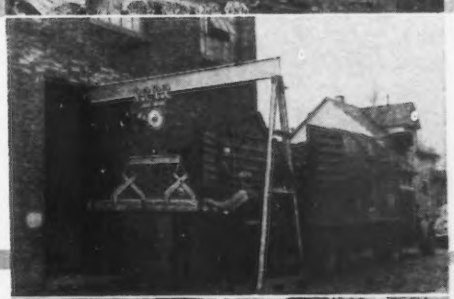
PRODUCTION INCREASE
From 26 to 48 tons per day.

By furnishing definite overhead routes for the movement of bar stock, congestion was eliminated. Free flow of materials to production machines nearly doubled their output.



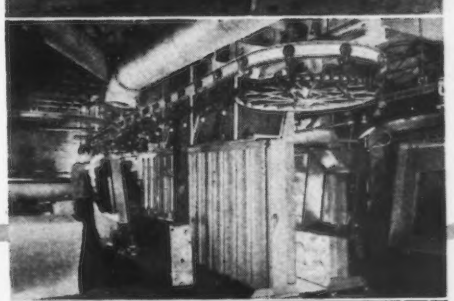
HANDLING COST
Saving of $150 in 4 months.

Transfer of sheet metal from truck to storage is costly when handled sheet by sheet. A simple system such as this actually saved $150 in handling cost within four months.



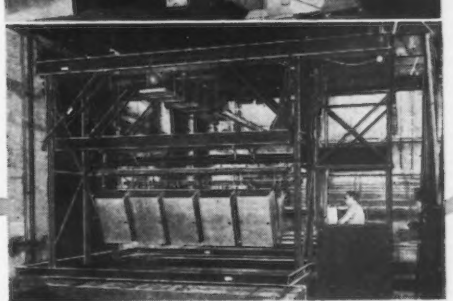
TIME SAVED
Drying time reduced 70%.

Passage of metal furnace parts through infra-red dryers cuts 70% from the time formerly required for drying. This operation on monorail also eliminates costly handling labor.



INCREASED CAPACITY
30% more units moved through process

Nearly a third more units can be handled from tank to tank throughout the cleaning process. All handling is controlled from cab by a single operator.



LABOR SAVED
Unloads truck with 26 less man hours.

Operators claim to save $20 per truck over former unloading costs. With power operated equipment and special grab for handling 2-ton loads, complete safety is assured.

Let an American MonoRail Engineer explain how similar savings can be made in your handling methods. Write for Bulletin C-1 showing successful applications.

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confidential, the Tariff Commission will publish the digests. The Dept. of Commerce will make a similar report on export items which the Committee proposes for inclusion in a trade agreement.

There will be analysis and consideration of the studies of the Tariff Commission and the Dept. of Commerce of views of interested persons presented to the Committee for Reciprocity Information and of other information available to the Interdepartmental Committee. The latter will then make such recommendations to the President relative to the conclusion of trade agreements as are considered appropriate to carry out the purpose of the trade agreement act. If recommendations are not unanimous the dissenting member or members of the Committee will be required to make a full report to the President giving the reasons for dissent. They also will be required to specify the point beyond which they consider any reduction or concession involved cannot be made without injury to the domestic economy.

There will be included in every trade agreement a most-favored nation provision securing for the exports of the United States the benefits of all tariff concessions and other advantages accorded by the other party or parties to the agreement to any third country. This provision—the so-called multilateral agreement—will be subject to the minimum of necessary exceptions and "shall be designed to obtain the greatest possible benefits of exports from the United States."

The Interdepartmental Committee was requested to keep informed of discriminations by any country against the trade of the United States which cannot be removed by normal diplomatic representations. If the public interest is served by such action the Committee was told to recommend to the President the withholding from such country of the benefit of concessions granted.

Reports Production Will Be Sufficient to Meet Large Building Needs

Washington

• • • **Production** of almost all items of construction materials is expected to be sufficient in 1947 to meet the demands of the anticipated large building program, the Construction **Div., Dept.** of Commerce has reported.

Large increases in production of practically all construction materials were registered in 1946, in many cases exceeding shipments or production in 1941. Prospects for this year are that output will continue to increase, according to a review of 1946 and a forecast for 1947. The review will appear in the forthcoming February Industry Report on Construction and Construction Materials. Some of the difficulties encountered by builders last year will again appear in 1947 because the supply-demand situation will be too closely matched for comfort, according to the report.

Despite the generally favorable outlook for 1947 there still is a chance of absolute shortages of a few materials such as cast iron soil pipe and inexpensive wiring devices and electrical products made of steel.

"Production of cast iron soil pipe registered one of the outstanding increases in 1946—almost double 1945 output—but the tonnage expected in 1947 may still fall slightly short of demand," the report points out. "Underlying the pessimistic viewpoint on electrical products is the continuing shortage of sheet and strip steel relative to demand and the possibility that small producers will be unable to obtain their requirements if the program of priorities for producers is abandoned in the spring of the year.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

YOU SEE THIS LITTLE HOLE IN THIS SHAFT? WELL, THAT'S A CENTER HOLE--I'LL EXPLAIN IT--
TH' BULL SHOWS THEM CENTER HOLES TO EVERY NEW GUY WHO STARTS HERE!
FOR FOUR YEARS ONE GUY OILED EIGHTEEN HOLES ON HIS MACHINE EVERY MORNIN'-- ONLY FOUR WERE OIL HOLES!
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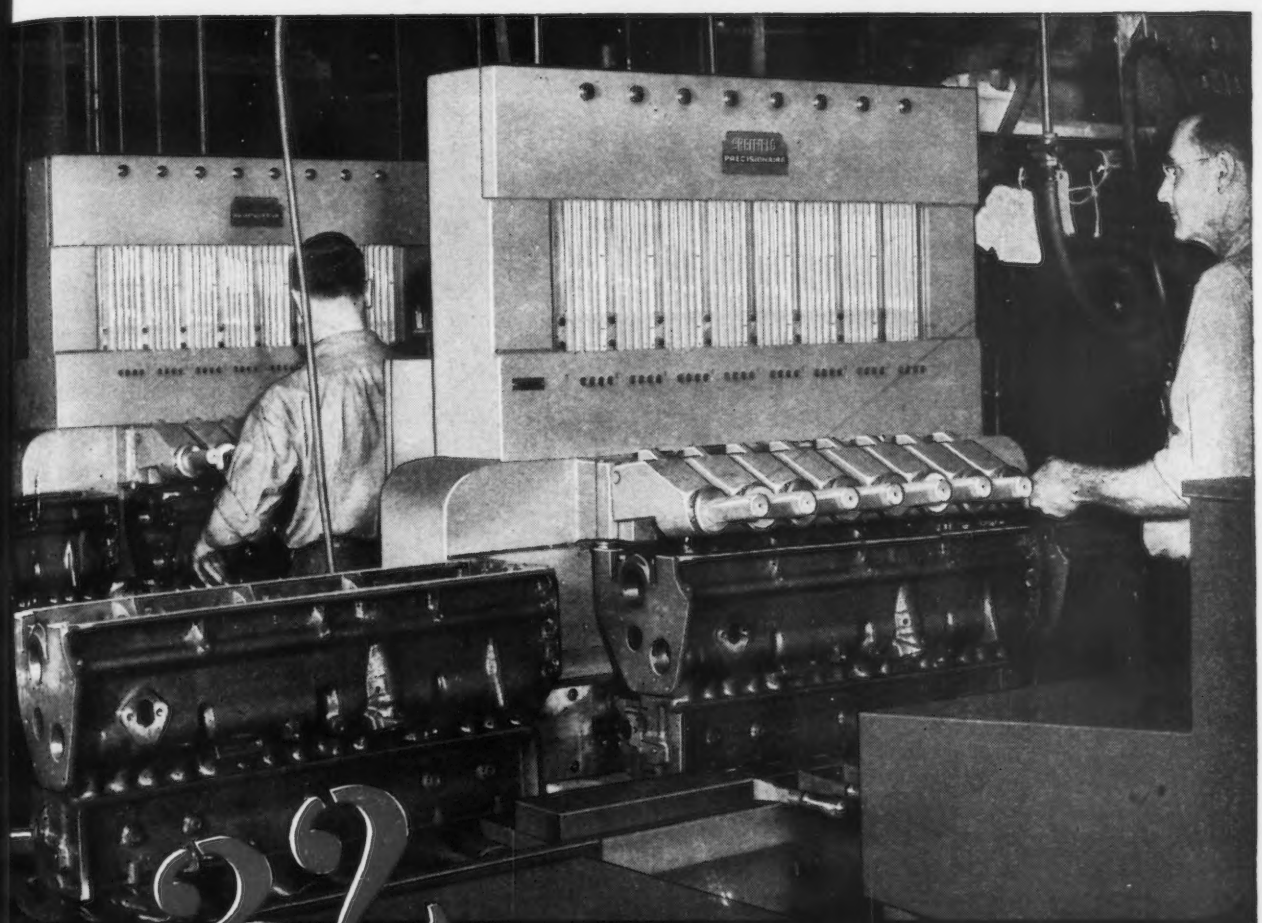
To Expand Car Plant

Washington

• • • **The Bethlehem Steel Co.** has received approval from CPA for the expansion of facilities for freight car production at Johnstown, Pa., at a cost of $1,477,400.

Also approved during the week ended Feb. 27 were:

Johns-Manville Corp., N. Y., Research Building, $1,764,756; the Wallace Barnes Co., Division of Associated Spring Corp., Bristol, Conn., addition to Spring & Spring Plant, $1,362,000; General Foods Corp., N. Y., research laboratory, $1,067,000, and the Landis Machine Co., Waynesboro, Pa., warehouse for fabricating tools (steel), $46,000.



32 Critical Points Checked In One Pass

One operator on each of these Sheffield Precision Gaging machines checks the diameter in each of the eight cylinder bores at four critical points, and stamps the true diameter of each cylinder into the block for accurate selective assembly—all at a rate exceeding 50 blocks per hour.

These gaging machines are right in the production line and are handled by production men. Skilled inspectors are not required because accuracy and productivity does not depend on the human equation.

Savings exceed significant original estimates and are accomplished in comparison with other methods requiring many skilled inspectors, large floor areas and considerably more time for inspection.

Standard gages and measuring instruments shipped within 24 hours.

Chek with Sheffield for possible ways to reduce your production costs and at the same time better product quality. Call Sheffield's local representative or write to us in Dayton.

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THE SHEFFIELD CORPORATION

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MACHINE TOOLS • GAGES • MEASURING INSTRUMENTS • CONTRACT SERVICES

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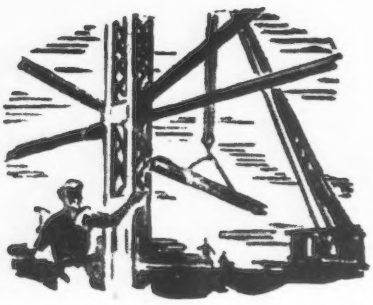
European Letter . . .

JACK R. HIGHT

• British Economic White Paper offers little encouragement to industry . . . Coal and power situation will probably be worse next year than this . . . Nation now faces chronic manpower shortage.



LONDON — The freak winter weather, the alarmingly high rate of expenditure of the American and Canadian loans to Britain, and frank appraisals of the British economic situation in two recent government "White Papers" have combined to throw this country into a national crisis that is unparalleled since the end of the war. To meet the crisis, various political expedients, including a coalition government have been discussed, but there seems to be no possibility of this occurring.

What must be done to correct the obvious flaws in the economy here are easily seen, but the precise means of accomplishing these ends are not so clear. The most recent White Paper, which was entitled "Economic Survey for 1947" did state clearly the problems and the goals, although there has been considerable press criticism that prescriptions for the various ailments were not described.

The cold blunt facts of the situation are set forth in the government paper in such uncompromising terms that the salient points will bear repeating here. These statements come from a government which derives its principal support from the working people who are suffering the most from the shortages that are dogging postwar Britain:

"The central fact of 1947 is that we do not have enough resources to do all that we want to do. We have barely enough to do all that we **must** do. Whether we reckon in manpower, coal, electricity, steel or national production as a whole, the conclusion is unavoidable. To get all we want, production would have to be increased by at least 25 pct. This is clearly impossible in 1947.

"We need more imports in 1947. In the past year we have been getting 70 pct of the 1938 quantities, and have had to draw on stocks. The 1947 program of imports provides an expansion to 80-85 pct of 1938 volume. But much more than that would be needed to increase rations considerably."

From the standpoint of the steel industry the White Paper did not outline any new important steps to be taken which would increase the output of steel this year. Commenting on the shortage of imports and the reduction in output caused by the coal shortage, the Paper states that it is hoped that 1947 output will not be far below that of 1946 (about 12,750,000 long tons). With imports, the White Paper states that the supply of finished steel for consumption in the United Kingdom should not be far below 9 million long tons, allowing for essential exports.

Steel consumption before the war in the United Kingdom never exceeded 8.5 million long tons of finished steel. In 1946 the consumption for the year was 8.1 million long tons, but the rate during the last quarter was actually 9.2 million tons.

IN contrast to the private opinion of steel sources in the government, the White Paper takes the view that there will be substantially greater supplies available this year than last, and that "there will be no great gap between supply and the essential needs of the major steel consuming industries." The estimate made by the government assumes that there will be no significant expansion in the labor force of the steel industry this year. Account is also taken of the effect that shortages of supplies of other raw materials will have on real steel demand.

Where the report resumes its characteristically grim air is on the discussion of steel consuming industries. The whole Paper takes note that one essential shortage throughout the economy is in manpower. Thus an effort is being made to increase output per man year in all industries, but apart from this increase, no other increases are expected from the major steel consumers.

It is stated that any substantial increases in the labor force of these industries would step up the demand for steel and nonferrous metals to such an extent that it would be impossible to maintain a balance. It is hoped by the government that sufficient steel will be available to cope with the increased demand created by increased productivity of the existing labor force.

It is admitted that this precarious balance in the steel industry is achieved only by cutting exports of steel to the bone. This policy is approached only as a short term expedient, with the government looking forward to the day when the export of finished steel products will play an important role in the total export program.

Although no mention is made of the fact in the White Paper, it is understood that there will be some shift in policy with respect to the direction on the small flow of steel exports which remains. In the past, most British steel exports have been to "soft" currency areas, and the steel industry has directed most exports to maintaining those markets. A struggle is now developing intragovernmentally between the Board of Trade, which is reasonably happy with the present system, and the Treasury, which is anxious to direct exports to dollar areas, and make up for the dollar shortage. Such a move is being discussed for steel in particular, and would mean, if the Treasury had its way, that South America in particular would become the target of larger British steel exports.

THE primary problem which is facing the British nation at the moment is a coal problem. The coal, which before the war

PRECISION --by the Ton

It's hard to imagine any work requiring more precise manual delicacy than that of a fine watchmaker. Handling tiny parts doesn't demand much strength, which is fortunate because hands capable of such fine work are seldom muscular. This combination of power plus precision—rare in machines—is the key to important production economies in modern industry.

It is common knowledge that *presses* deliver parts faster and at less cost than any other means of production. They exert enough force to make cold metal flow, and ordinarily shape complete parts in a single stroke. Clearing presses have been designed and built to extend that kind of economy to "stampings" weighing as much as a ton each, and to forming and coining operations where tolerances are expressed in ten-thousandths of an inch. Finished parts formerly cast, or welded, and slowly machined, can often be produced to advantage on a Clearing press.

Traditional methods of manufacture may be costing you unnecessary production expense. If you'd like to look at your operations in a new, modern light, Clearing can help you. It's worth trying, and it costs you nothing to consult with our engineers. A letter, a phone call or a telegram today might bring you a valuable weapon for the competitive business battle of tomorrow.

The progress of modern science is being helped by this specially built, high-precision Clearing laboratory press.

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THE WAY TO EFFICIENT MASS PRODUCTION

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was exported to buy essential imports and luxury goods as well, is now not even mined in sufficient quantities to meet essential domestic needs. The White Paper points out that exports, industrial modernization, housing, the supply of consumer goods, transportation, and distribution all depend on coal.

The facts in brief are these:

In each of the past 3 years Britain entered into the winter with lower stocks than the year before. The year 1946 saw 189 million tons of coal produced, but 194 million consumed. Today there are no more stocks to draw from. The target for 1947 coal output is 200 million tons, an "indispensable minimum." Reaching this figure will be a difficult task for the British coal industry this year.

The government hopes to find more miners, increase the output per miner, and secure as much fuel economy as possible. The following years will call for even more coal than this year. Every expansion of industry in Britain calls for more power and indirectly for more coal.

The pressing power crisis which is harassing both domestic and industrial users stems partly from the coal shortage. On the other hand, there is an excess of consumption over installed capacity. The government on this score can do no better than to predict that the present emergency will be slow in righting itself after the winter weather passes, and that although new generating equipment will be gradually coming into use, the power position is likely to get worse in the next two years.

THE railways are still carrying a high volume of business, despite a large backlog of building and repair work which must be done. The shortage of serviceable rolling stock has already hampered operations this winter, and may be expected to do so again next winter. Steel mills were shut down during this winter for lack of freight cars, and a general tightness of cars is causing some difficulty in the coal mines.

Britain, barring the American vessels which it is operating on charter, has a considerably smaller merchant shipping fleet than prewar, and is determined to recoup this important source of invisible exports. The British Government hopes to obtain a reasonable time to return the American ships which are under charter and to build more ships. Steel circles, however, indicate that due to the increasing shortage of semis, and a tightness of plates that is becoming acute, the allocations to the shipbuilding industry seem likely to be cut.

The provision of new machinery and construction for industry and of homes will be limited by a shortage of manpower, and of raw materials. The government is maintaining close control of the capital equipment program, and is planning to postpone programs which are of lesser importance, or are of a long-term nature.

COAL PUTS TO SEA: *Disruption of rail transportation in Britain is forcing shipment of coal by sea, bypassing blocked tracks. Here at the Cardiff docks, South Wales, a 2300-ton cargo awaits a Liverpool boat.*

TO ease the broad manpower shortage, the British Government hopes to improve the distribution of labor, increasing the total labor supply and increasing the output per man. The distribution problem is a real one, as in South Wales at the beginning of the year the unemployment was running at the rate of 7.5 pct, while in other areas it was below 1 pct and the demands at local labor exchanges were not being met. As the wartime direction of labor has been abandoned, there is no single surefire approach that the government can make to this problem. There is the long-term project of moving the industries to the people by means of the "development areas," which encompass the primary prewar depressed areas.

To increase the labor force women are to be encouraged back into industry, and old people are being urged to remain at work where possible. Foreign labor may be called in in some numbers to help the situation as well, as the government made a positive statement on this subject. It is a delicate problem, where the Labor Government finds itself smack up against the old ingrained prejudices of the trade unions. This conflict will take some time to dissolve, so that this approach as well is not too good as an immediate short-term solution.

The primary problem from the standpoint of manpower is that Britain is now a country with a serious chronic shortage of labor, a reversal of historic conditions. Under the government policy of full employment, this condition will continue. All of the restrictions, prejudices and limits placed on the utilization of labor in depressed periods will have to be swept away in this situation.

The brief paragraphs included in the Paper hold forth some encouragement to industry in that foreign exchange is available for modernization programs, but little balm for the average British citizen. He is getting obviously bored with austerity, and the plans outlined for him are still in the same category. No more food is promised for the rations, and the government says of clothing and household goods shortages simply that they "will necessarily continue."

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Ralph C. Coxhead Corp. of New York has a new Vari-Typer that uses 600 styles and sizes of type, plus foreign language, chemical, mathematical and other symbols.

get ready with CONE for tomorrow

Patent 2,409,181 covers a sectional motor truck that can be separated into three pieces and carried anywhere by air.

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Stromberg-Carlson has a new inexpensive adaptor that will enable most owners of pre-war FM sets to receive broadcasts on the new band.

get ready with CONE for tomorrow

Frigidaire, Division of General Motors, is making a plastic lid for its ice cream cabinets that is claimed to be 50% lighter than steel.

be ready with CONE for today

New England Carbide Tool Co. is taking tungsten carbide to the housewife in its new precision knife sharpener.

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The State of Minnesota will go into business with Continental Machines, Inc. to engage in a continuous chemical process for the extraction of pure iron from slate formerly wasted at the Mesabi iron range.

be ready with CONE for today

The New Holland Machine Co. of New Holland, Pa., will test its new flame cultivator on truck and garden crops in the Rio Grande Valley this winter.

get ready with CONE for tomorrow

Bell System's first experimental rural radio-telephone circuit connects 8 Colorado farms with the Cheyenne Wells central office. Wind driven generators supply power.

The four largest alternating current motors ever built, 65,000 horsepower each, will be made by Westinghouse for Grand Coulee.

be ready with CONE for today

Lockheed's Little Dipper light plane is reported to cruise at 100 m.p.h. and land at 20.

get ready with CONE for tomorrow

A mobile alcohol plant built into a five car train that could travel from farm to farm was demonstrated at the National Chemical Exposition.

be ready with CONE for today

Phthalic anhydricle, one of the most important ingredients in the manufacture of paints, is now being made from petroleum by Oronite Chemical Company.

Climax Molybdenum Corp. is working on two new high temperature alloys. One has 60% chromium, 25% molybdenum and 15% iron. The other has 60% chromium, 15% molybdenum and 25% iron.

get ready with CONE for tomorrow

The Gyro-Glider developed at the General Electric Flight Test Center has a rotor instead of wings and weighs 120 pounds, ready to fly.

be ready with CONE for today

M. W. Kellogg Co. has a new process for separating a considerable number of useful substances from fish and vegetable oils using liquefied propane at high pressure.

get ready with CONE for tomorrow

The Texas Company's new cold weather aircraft fuel is claimed to start an engine and to permit switching to regular aircraft gasoline in two minutes, in spite of extremely low temperatures.

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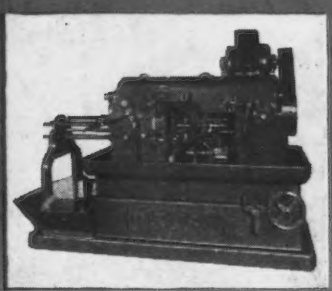
MORE facility is MORE value

The ⅞" 4-Spindle Conomatic, ordinarily assigned to rugged jobs, produced the brass pieces shown in 6 seconds each, including tapping.

Ask your CONE representative to show you our new color motion picture



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

38

West Coast . . .

ROBERT T. REINHARDT

• Southern California industries at high levels, but expect real boom when CPA restrictions end . . . Kaiser production costs reported lowered . . . Geneva increases operations.

LOS ANGELES—Southern California's basic industries are doing quite well, thank you, and as soon as the Civilian Production Administration folds up and $225 million worth of dammed up construction is permitted to start, the lid will really be off—that is the consensus of business leaders in the area as told to industrial writers on the NAM and State Chamber of Commerce sponsored press tour.

Agriculture, food processing, motion picture production and tourist business are all increasing in importance, but manufacturing and heavy industry are laboring under material handicaps and restrictions, and the important airframe industry is keeping a weather eye on congressional action on the budget. A serious cut in the military appropriation would be a body blow to the aircraft builders.

AiResearch Mfg. Co. here, which specializes in manufacture of plane cabin pressure regulators and air conditioning units for aircraft and is credited with doing much of the pioneer work on high altitude flying which made this form of attack practicable during the war, is feeling the pinch of material shortages. According to J. C. Garrett, president, the lack of $4 worth of bearings tied up $300,000 worth of work last month and bimetal points, fine gage copper wire and lamination steel are on the short list to the extent of seriously cutting down production.

Primarily interested in the aircraft industry, AiResearch is in a favorable position to convert to other products in the event the aviation field suffers a recession, according to the president. Emphasis is being placed on production of precision machines although large and well equipped laboratories employ 150 men in research. Employment now totals 1400 in the local operation.

GENERAL MOTORS CORP.'s southern California plant at South Gate, now employs 2500 persons and reconversion and expansion begun at the end of the war is practically completed. Approximately 350,000 sq ft of floor space was added to bring the total for the plant to more than 1 million sq ft.

This operation was closed to auto production during the war and reopened in May, 1946, to produce Buicks, Oldsmobiles and Pontiacs, and is now rated as the largest auto assembly plant west of Kansas City. GM has purchased 125 acres of land in nearby Van Nuys where another assembly plant is under construction which will approximately double local production which is now 32 cars an hour and working a five-day week. Shortages of parts and steel sheets continue to restrict production according to Henry L. Clark, plant manager. The Van Nuys plant, expected to be completed this year, will turn out Chevrolet passenger cars and trucks.

In discussing the integration of industry in this area, Mr. Clark pointed out that GM is now purchasing approximately $60 million worth of components annually in the West for all of its plants and that the local purchases alone approximate $20 million per year.

The importance of GM's assembly plants in the West is indicated by the fact that it is the second largest shipper and receiver of freight in the state. According to Mr. Clark, GM ships out or receives 8200 carloads a year which is exceeded only by the 28,000 cars per year shipped or received by California Fruit Growers.

Good news for western steel users, tempered with a few cold facts about what high fixed charges can do to prices, was reported by Henry J. Kaiser, Jr., assistant secretary of Kaiser Co., Inc. and F. M. Rich, vice-president in charge of manufacturing. According to these executives, the Fontana steel plant is now producing iron at less than the cost of heavy melting scrap on the West Coast and its openhearths are turning out steel for 10 pct less than the cost of scrap in the East. Mr. Rich also stated that when Eagle Mountain ore is made available in about a year that the cost of iron will drop another $2.00 to $3.00 a ton. Work on development of the mine is proceeding although a suit is pending between former owners of the property in which the Kaiser interests are not named as parties.

At present approximately 60 pct of the ore used at Fontana is being brought in from Utah and 40 pct is being taken from the Vulcan mine. This blending is said to overcome the high sulphur content of the Vulcan ore to a large extent.

STATING that, "Our iron and steel costs are as low or lower than the industry average," Mr. Kaiser added that these low costs alone could not keep the Fontana plant alive in the face of the high fixed charges it is bearing. He pointed out that while the industry average fixed charges is 78¢ per ton of capacity, Kaiser Co., Inc., was carrying a load of $21.40 per ton including $5.00 per ton for depreciation.

Kaiser Co., Inc., is now seeking an extension of its loan period to RFC which will enable the company to reduce yearly payments which now call for the payment of $40 million by 1961.

In discussing the objections raised by Kaiser Co., Inc., and others to the $9.60 Geneva to California freight rate which was suspended before it became effective, Mr. Kaiser pointed out that his

Tip-top Skill

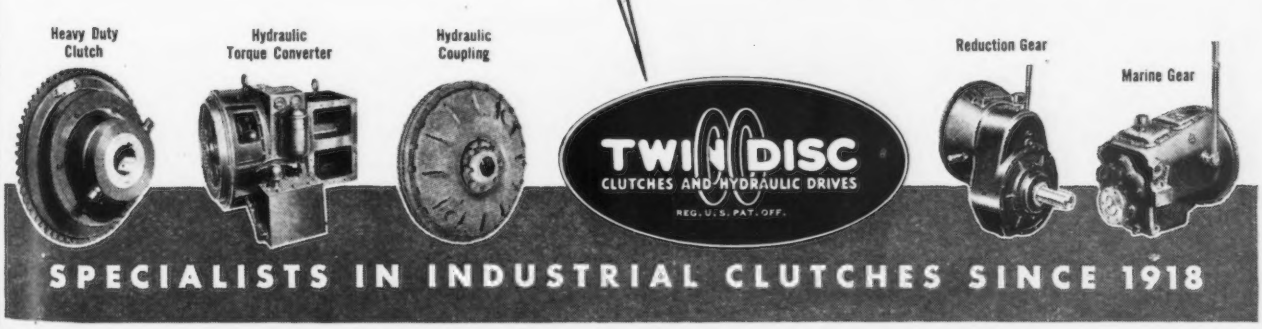
Far above the ground the high climber digs his climbing irons into the swaying giant of the forest and coolly goes about his task of "topping" the towering trunk. When he finishes, the tree will stand as a gaunt, naked spar, to be guyed and fitted with cables, then used in "yarding" or "cold-decking" logs.

Experience tells the high climber when the treetop is ready for its earthward plunge... tells him when and how to get set for the vicious backlash that could hurl him from his precarious position.

Experience...but of a different kind...is vital in the manufacture of friction clutches and hydraulic drives that can withstand the demands of sudden shocks and continuous gruelling operation.

For 29 years the Twin Disc Clutch Company has been designing, building, selecting and applying proved power transmission units. This background of experience enables Twin Disc engineers to study your installation and then recommend the particular Twin Disc unit best suited to keep your equipment operating smoothly hour after hour.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois)



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

company would be happy to see the low rate established, but that if it was, comparable reductions should be granted to all mills affected to maintain competitive conditions.

The plant is now operating at near capacity with only one openhearth down to change it over from the tilting type to a stationary unit. This work is expected to be completed within a week or two.

Fontana's scrap situation is improving with about 35,000 tons on hand, and a 54-day supply of coal offers some security in the event of another coal strike. Openhearth charges have been averaging approximately half scrap and half hot iron. No merchant iron is being made for the market and that used in the plant's foundry is conditioned with silicon in the ladle at the blast furnace.

The plant payroll is now 3300 and it is expected that 750 more will be added in the fall of this year when the Fretz-Moon pipe equipment and the cold strip mill get into operation.

Emphasizing the diversification and balance of industry in Los Angeles County, James F. Bone, manager of the city's chamber of commerce industrial department, pointed out that there were nine predominant industries in the area which ranked as follows: Aircraft production, first nationally; motion pictures, first nationally; automobile assembly second only to Detroit; petroleum refining, among top three areas; rubber tires and rubber goods, second only to Akron; furniture manufacturing, fourth nationally; oil well equipment and tools, first nationally; food products, rank not determined; sportswear manufacturing, first nationally.

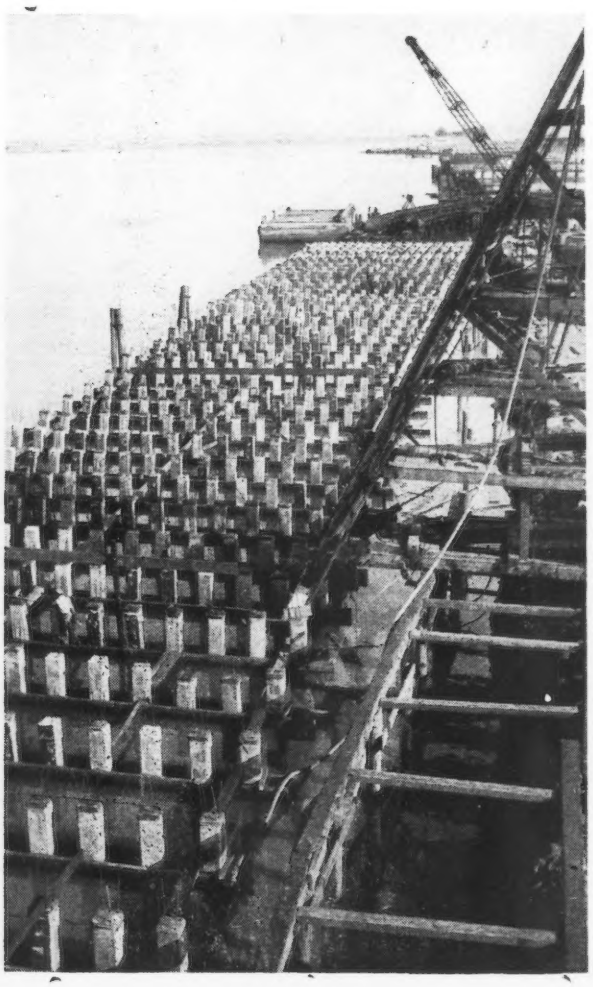
SALT LAKE CITY—All production facilities at the Geneva Steel Co. plant, except two openhearth furnaces are now in operation. The third blast furnace which was down for repairs, was recently blown in. Currently operating are all four batteries of coke ovens, seven of the nine openhearths, the three blast furnaces, the plate and slab mills on a 3-shift, 5-day week basis and the structural mills on a 2-shift basis. The structural mill is scheduled to go to three shifts within a week or two.

Employment at the plant is 3600 and including all of the company's operations approximately 5000.

Coal and ore supplies which have heretofore dictated the level of operations, have improved some, but the company is confronted with railroad car troubles on the iron ore haul in the near future. Cars borrowed by the Union Pacific railroad from the Chicago & Northwestern will shortly have to be returned for the Mesabi ore hauling season.

Industries of Utah are currently pushing bills in the state legislature designed to force an equalization of property valuations for taxation purposes. The measures would require valuation at 50 pct of reasonable money value, based on average market price for the past 20 years, and strengthen the power of the state tax commission to require compliance by the county assessors. Mines and utilities, assessed directly by the tax commission, have long felt that they are overassessed in comparison with farms and homes.

Inequities of wide variations in valuation have been multiplied by a change in the public school financing program which will shift the large share of the levy for this purpose from a local district to a statewide basis.



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RAIL AND WATER MEET: *When completed, this 600-ft concrete dock will accommodate ocean-going vessels to provide ship to rail facilities for Columbia Steel Company's Pittsburg, Calif., plant. This construction is a part of Columbia's $25 million expansion program at Pittsburg where new cold-reduction sheet and tinplate mills are being installed.*

o o o

Removes Can Size Limits

Washington

• • • **CPA has removed all size restrictions on tinplate and terneplate cans under an amendment to Order M-81, effective March 7.**

Announcing the removal of can size limitations, CPA said that an allotment for 1947 of 32,000 tons of tin for the production of tinplate for all purposes has been tentatively agreed upon, but would not be increased because of the relaxation of can size specifications. Because of the tin supply situation it now appears doubtful whether the entire amount of the tentative allocation will be available to tinplate producers.

SPRINGFIELD MACHINE TOOL COMPANY

Uses

VICKERS

HYDRAULIC CONTROLS

to achieve

- INCREASED PRODUCTION
- BETTER WORK FINISH
- SIMPLICITY OF INSTALLATION
- VERSATILITY OF OPERATION
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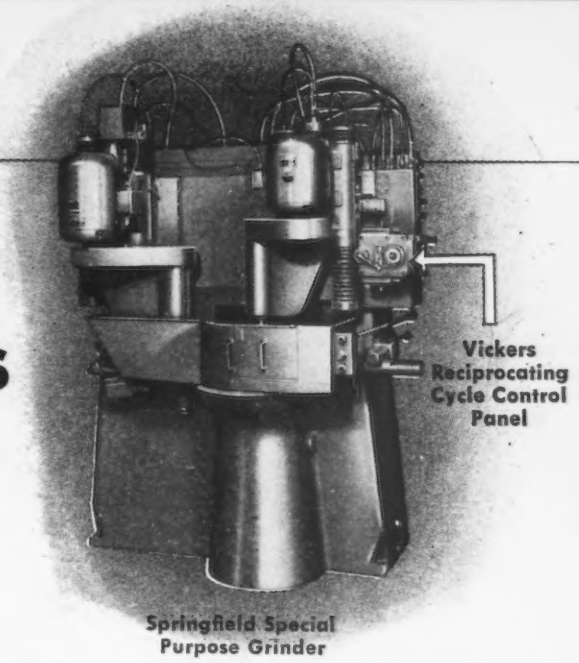

Springfield Special Purpose Grinder

The manufacturer has utilized Vickers Hydraulic Controls on this special purpose grinder to provide an important increase in production, better work finish, simpler operation, and protection for the operator, machine and work.

The machine grinds the backface and bore of the ring gear in one setup. Each grinding wheel is reciprocated hydraulically in proper sequence. All phases of machine cycle operation are interlocked hydraulically to prevent damage to work and machine.

Vickers Reciprocating Cycle Control Panel provides smooth reciprocation of grinding wheel, thus providing better finish. Stroke lengths are adjustable and maintained accurately thus eliminating unnecessary and time-consuming overtravel for a specific setup. Adjustable speed hydraulic drive of work spindle makes possible the best combination of speeds for better finish.

Other Vickers Gasket Mounted Valves (in panel type assembly shown below) permit low cost installation and greater accessibility for adjustment and maintenance. They centralize hydraulic equipment for space saving and improved appearance . . . piping is simplified.

A Vickers Application Engineer will be glad to discuss with you how hydraulic controls can be used to advantage on your products. Get in touch with nearest office listed below.

This is one of a series of applications pointing out the many advantages of Vickers Hydraulic Controls.

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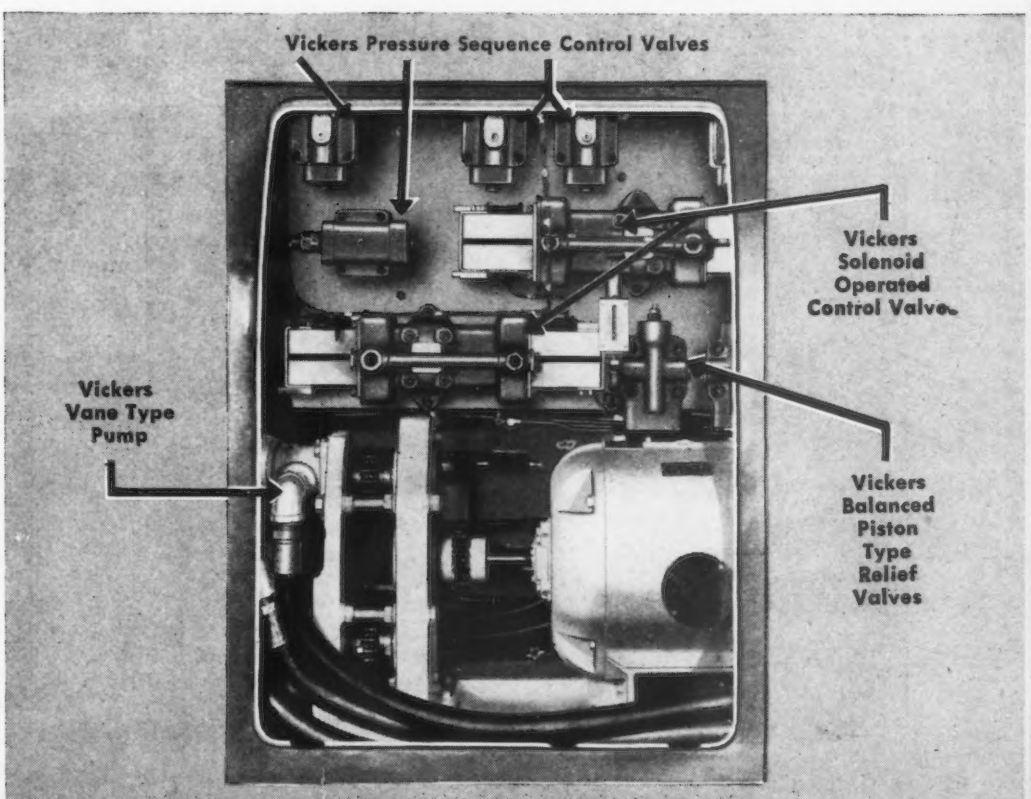
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921


Vickers Pressure Sequence Control Valves
Vickers Solenoid Operated Control Valves
Vickers Vane Type Pump
Vickers Balanced Piston Type Relief Valves

Rear View of Springfield Grinding Machine with Cover Plate Removed

PERSONALS

° ° °

• **H. J. Fraser** and **H. J. French** have been elected additional vice-presidents of the International Nickel Co., Inc., New York. Mr. Fraser has been assistant vice-president since 1943. Both he and Mr. French are assistant vice-presidents of the International Nickel Co. of Canada, Ltd., the parent company.

• **C. W. Conn** has resigned his position as assistant openhearth superintendent, Kaiser Co., Inc., Iron & Steel Div., Fontana, Calif., to assume the position of superintendent of openhearth for the Ford Motor Co., River Rouge, Mich.

• **J. R. Esposito** has been elected a vice-president of Interchemical Corp., New York. **J. G. Morris**, formerly executive vice-president of the Finishes Div. of Interchemical, succeeds Mr. Esposito as president of that division. Mr. Esposito began his career as a salesman in the New York office of the Ault & Wiborg Corp. In 1928 the corporation became a subsidiary of Interchemical and later was consolidated with the **Murphy Varnish Co.** and Scriver & Quinn of California to form the Interchemical Finishes Div. He has been president of this division and the former Ault & Wiborg Corp. since 1931. Mr. Morris started with the Ault & Wiborg Corp. in 1931. Before coming East in 1944, he was vice-president and general manager and made his headquarters at the main plant in Cincinnati.

J. R. ESPOSITO, vice-president, Interchemical Corp.

• **John Baldwin** has been appointed assistant chief engineer with direct supervision of the project engineering and drafting design groups of the Weatherhead Co., Cleveland. **Mr. Baldwin** formerly was automotive project engineer at Weatherhead. **B. R. Teree** has been appointed laboratory director of Weatherhead. In his new position, Mr. Teree, formerly project engineer in charge of aircraft development, will have supervision over the large Weatherhead engineering laboratories. Before joining the company he was in charge of all Curtiss-Wright experimental and production design of hydraulics, landing gears, tail wheels, and arresting gears.

• **George F. Jenkins** has been promoted to the position of assistant sales manager of the National Screw & Mfg. Co., Cleveland. He replaces **C. L. Kerr** who has resigned. For the past 2 years, Mr. Jenkins was district sales manager in Chicago, covering the midwestern territory. He has been with National Screw for 20 years.

• **T. P. Underwood** has been appointed head of the Indianapolis office of Vanadium-Alloys Steel Co., Latrobe, Pa. Mr. Underwood was a member of the company's Pittsburgh staff before the war.

• **David E. Lukens** has been appointed general manager of the Philadelphia Tube Co., Philadelphia. Mr. Lukens was formerly sales engineer of the Summerill Tubing Co. In addition to this appointment, he will continue as engineering representative for the Autogiro Co. of America.

• **Kenneth L. Walker** has been appointed vice-president in charge of production of the Kalamazoo Stove & Furnace Co., Kalamazoo, Mich. Since 1940, he has been head of his own company in Detroit, known as Walker & Associates.

• **William A. Ferguson** has been promoted from vice-president to president of the Standard Electrical Tool Co., Cincinnati.

• **C. C. Chamberlain,** general sales manager, and **James L. Dunn,** vice-president in charge of industrial relations of Jenkins Bros., New York, have been elected to the board of directors of the company. Mr. Chamberlain joined the company in 1929. Starting as an assistant in the advertising department, he was appointed advertising manager in 1932, and advanced to publicity manager in 1940. He was named general sales manager in 1942. Mr. Dunn joined Jenkins in 1913 as a valve assembler. In succession he advanced to timekeeper, payroll clerk and cost clerk. After 2 years in service during World War I, he returned to Jenkins as rough stock clerk. He rose to production manager, business manager and assistant plant manager, and in 1944 was named vice-president in charge of industrial relations.

• **Charles H. Krane** has been appointed field engineer of the Norton Co. Mr. Krane has been assigned to the territory which has its headquarters in Hartford, Conn.

• **Wendell M. Jones,** following 21 years' service with the company, has been appointed vice-president and general manager of Bethlehem Steel Supply Co. of California, succeeding **George W. Schweinhard** who has retired after 25 years as active head of the company he founded.

WENDELL M. JONES, vice-president and general manager, Bethlehem Steel Supply Co.

• **Keith Rindfleisch** has been appointed district manager of U. S. Steel Supply Co.'s Pittsburgh warehouse. He succeeds **J. H. Fogwell,** who has retired after 47 years of continuous service. Mr. Rindfleisch began his service with this U. S. Steel subsidiary at its Chicago office in 1932 as a sales department clerk. Subsequent promotions in the sales and order departments of the company brought him to the position of assistant district manager in Cleveland, the position he held prior to his present appointment. **Wallace W. Clevenger** has been appointed assistant district manager of the Cleveland warehouse of U. S. Steel Supply Co., succeeding Mr. Rindfleisch. Mr. Clevenger began with U. S. Steel subsidiaries in 1933 as a sales department clerk, and has held various positions in the sales organization, becoming a salesman in the Cleveland territory in 1937. He leaves this post for his new appointment.

• **E. Labadie,** of the process engineering department, has been advanced to the post of service manager, Progressive Welder Co., Detroit. In addition to his experience with Progressive on process engineering, Mr. Labadie is a former welding engineer and plant engineer with General Motors Corp. **Al Seedorff has been** appointed exclusive representative for the state of California for Progressive Welder, making his headquarters in Los Angeles. He represented Progressive in Los Angeles prior to the end of the war. In the spring of 1946 he returned to Detroit.

• **Albert W. Vanderhoof** has been elected chairman of the board and president of Standard Duplicating Machines Corp., Everett, Mass.

• **John A. Cuneo** has been named manager of Fairbanks, Morse & Co.'s Los Angeles branch, succeeding **Harry W. Brown** who has retired. Mr. Cuneo joined Fairbanks, Morse & Co. in 1929 as a field engineer representing the company's export division. In recent years he has been assistant manager of the export division in New York and for the past 2 years was a member of the organizing staff of Fairbanks-Morse de Mexico in Mexico City.

EMMETT A. WILLIAMS (left), vice-president in charge of operations, and I. E. COX (right), vice-president in charge of engineering, National Bearing Div., American Brake Shoe Co.

• **Emmett A. Williams** has been appointed vice-president in charge of operations, and **I. E. Cox,** vice-president in charge of engineering of the National Bearing Div. of the American Brake Shoe Co., New York. Mr. Williams, works manager since 1942, has been with National Bearing since 1913 working in an operating capacity. Mr. Cox, formerly chief engineer, first started at National Bearing as research engineer in 1935.

• **P. L. Barter** has been elected vice-chairman of the board of directors of McCord Corp., Detroit. He will continue as vice-president, a position he has held for the past 23 years.

• **J. G. Bollinger** has been appointed district sales manager of Air Reduction Sales Co. Mr. Bollinger served in the armed services during World War II and rejoined Airco last July. He has had more than 20 years' service with the company. His headquarters will be in the new Air Reduction offices at Emeryville, Calif.

• **W. J. Gleason** has been appointed export sales manager of the Kaiser Co., Inc., Iron & Steel Div., Oakland, Calif. Mr. Gleason formerly headed combined export operation of several Henry J. Kaiser-managed companies. He joined the Kaiser organization in 1942 as general traffic manager of Richmond Shipyard 3.

• **E. J. Hunt** has been named production manager of the Continental Motors Corp.'s Detroit engine plant which was recently leased by Kaiser-Frazer Corp. Mr. Hunt, who is operations manager for Kaiser-Frazer, will spend his time in the Detroit plant during the initial production period. **T. A. Bedford** has been appointed administrative manager of the new K-F engine division. **W. A. Cannon** will be director of purchases and **J. J. Gorman,** plant comptroller.

• **Charles R. Ellicott, Jr.** has been appointed industrial sales representative of the Symington Gould Corp. with his headquarters in New York. He will represent the company in the sales of industrial and miscellaneous carbon steel and alloy steel castings in the New York, New Jersey and Pennsylvania areas. Prior to joining the Symington Gould Corp., he served in the Maritime Commission and the Navy during the war, and earlier, was sales engineer with the Westinghouse Electric Corp.

• **Floyd Jones** has been appointed sales manager of the portable compressor division of the Davey Compressor Co., Kent, Ohio. For the past 2 years Mr. Jones has been Davey's northeastern district manager in charge of the New York, New England and southeastern Canadian territories.

• **F. G. Sorensen,** former vice-president, has been elected to the newly created position of chairman of the board of the Cincinnati Gear Co., Cincinnati. **Paul W. Christensen, Jr.** has been named vice-president, and **Paul W. Christensen, Sr.** has been reelected president with **H. S. Miller,** secretary-treasurer.

• **Michael F. Biancardi** has been appointed manager of Allis-Chalmers Mfg. Co.'s health and safety department, Milwaukee. He has been connected with the company since 1940. **Walter Giger,** formerly chief engineer in the railway locomotive division of Brown-Boveri & Co., Baden, Switzerland, has rejoined the Allis-Chalmers Mfg. Co. and has been placed in charge of promoting the firm's interests in the transportation industry. Mr. Giger was in charge of railway sales and engineering in the Allis-Chalmers electrical department from 1931 through 1937.

• **George R. Lundberg** has been appointed personnel manager of the Osborn **Mfg. Co.,** Cleveland. Mr. Lundberg, a veteran of 15 years of service with Osborn in its accounting, production and sales divisions, succeeds **T. W. Spoeri,** who has resigned.

• **Harold F. Bower,** formerly in charge of the Truarc technical service staff, has been named sales manager, Truarc Retaining Rings Div., Waldes Kohinoor, Inc., Long Island City, N. Y.

RALPH E. LARRY, whose election as vice-president of Pittsburgh Limestone Corp. was announced in the Mar. 6 issue.

• **Harold J. Rennpage** has been appointed assistant to the field service manager of Twin Coach Co., Kent, Ohio. Originally with Fageol Products Co., a subsidiary of Twin Coach, Mr. Rennpage was transferred to the service division of the parent company last year. Prior to joining Twin Coach, he was associated with Cleveland Pneumatic Tool Co. for a number of years.

• **Roy E. Hammond** has been elected comptroller of the General Motors Corp., Detroit, succeeding the late A. C. Anderson. Mr. Hammond was made assistant comptroller of the corporation in 1944.

• **Robert L. Schroy** has been appointed to direct sales activities of Columbia Rubber Co., Ravenna, Ohio, a division of the U. S. Stoneware Co. Mr. Schroy comes to Columbia from Firestone Tire & Rubber Co. with whom he had been connected for some 11 years.

• **John E. Payne** has been appointed headquarters industrial sales manager for Westinghouse Electric Corp., Pittsburgh. Mr. Payne, who was formerly manager of industrial sales for the central district, succeeds **C. B. Stainback** who has been named industrial syndicate manager to coordinate the company's overall apparatus sales activities.

• **Sidney A. Lewis,** formerly serving in the U. S. Army Chemical Warfare Service, has joined the U. S. Stoneware Co.'s process equipment division's sales engineer force. He will make his headquarters at the New York office of U. S. Stoneware.

• **Michael J. Batenburg** has been appointed manager of paint advertising for the Pittsburgh Plate Glass Co., Pittsburgh. He succeeds the late Edward J. Allee. Mr. Batenburg has been associated with Pittsburgh Plate since 1939. He joined the firm's paint division as an industrial sales representative at Chicago and later served in the St. Louis territory. He has been manager of sales service for the paint division with headquarters in Pittsburgh during the past 6 years.

...OBITUARY...

• **Carlos W. Van Law,** 73, mining engineer with the Vanadium Corp. of America, New York, and vice-president of its subsidiary, Rhodesian Vanadium Corp., died on Feb. 26, after a brief illness.

• **Ernest W. Sternberg,** 68, executive vice-president and one of the founders of the Sterling Motor Truck Co., Milwaukee, died suddenly Feb. 24.

• **Louis B. Patterson,** 80, one of the founders of the Avey Drilling Machine Co. of Covington, Ky., died recently.

• **W. F. Kaynor,** president and treasurer of Waterbury Companies, Inc., Waterbury, Conn., died Feb. 23.

• **William S. Armstrong,** 59, vice-president of Henry Disston & Sons, Inc., Philadelphia, died Feb. 17 following a month's illness. Twenty years ago he was made secretary-treasurer of the firm and was moved up to a vice-presidency in 1940.

• **Eric C. Gyllensvard,** export and New York office manager of Farrel-Birmingham Co., Inc., was killed on Feb. 17, when struck by lightning while in Brazil. He became associated with the Farrel-Birmingham organization in 1944.

• **Isaac Cohen,** 63, died Feb. 24 after 4 months' illness. He was president of the Metal Purchasing Co., Inc., of New York.

• **Henry L. Randall,** president of the Riverside Metal Co., Riverside, N. J., for over 40 years, died Feb. 18.

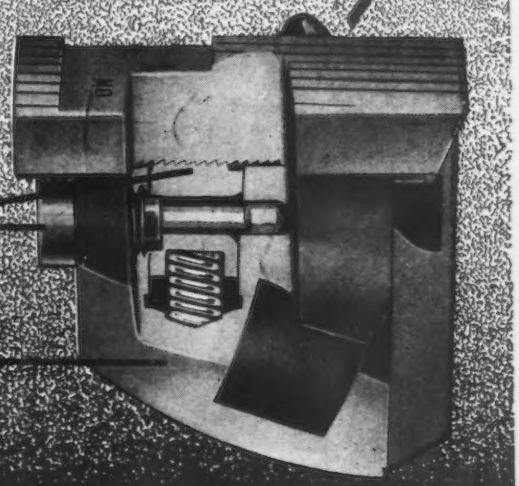
• **James B. Robarts,** 37, general superintendent of the Superior Sheet Steel Div., Borg-Warner Corp., Canton, Ohio, died Mar. 1. He had been associated with the company for 21 years.

• **Herb A. Froemming,** 48, president and treasurer of the Froemming Corp., Milwaukee, died Feb. 23 after a short illness.

Five Good Reasons Why...

JONES & LAMSON

Ground Thread TANGENT CHASER DIE HEADS



PRODUCE BETTER THREADS at LOWER COST!

THREAD QUALITY

1. The Die Heads are hardened and ground throughout. The body is not only ground, it is lapped on the face and in the dovetail slots. The bearing surfaces of the chaser holders are also ground and lapped into the body.

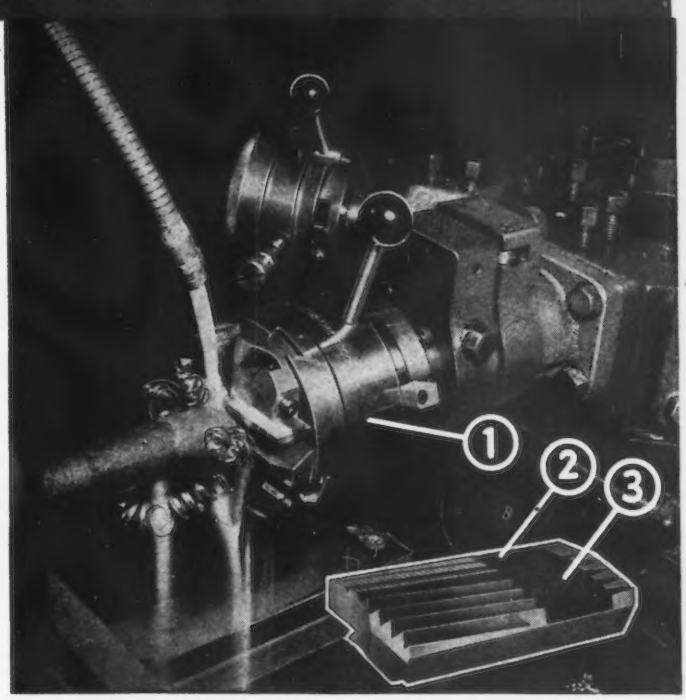
2. Jones & Lamson Ground Thread Tangent Chasers are guaranteed to produce threads to Class III specifications.

3. *The exact helix angle, in fact all the elements of an accurate thread are ground into the chasers after hardening.* The possibility of poor quality threads and costly scrap, due to faulty chaser setting, is eliminated.

ECONOMY

4. *Jones & Lamson Tangent Chaser Die Heads are universal. Only one set of chaser holders is required for all right-hand threads, and only one set of holders is required for all left-hand threads within the rated capacity of the die head, regardless of pitch or diameter* Investment in chaser holders is reduced to a minimum. Change over and set up is speeded.

5. Chasers are easily and quickly set. Ratchet-teeth on the back of the chasers, corresponding to ratchet-teeth in the holders, provide definite locating points for resharpening, measuring and setting. The chasers are positively and quickly secured. A couple of turns of a single screw releases or secures them in the holders.



If you are interested in greater economy and better quality in threading, fill in the coupon and we will send you our valuable handbook "Thread Elements and Formulas", together with complete information about our Die Heads.

JONES & LAMSON
MACHINE COMPANY
Springfield, Vermont, U. S. A.

Manufacturer of: Universal Turret Lathes, Fay Automatic Lathes, Automatic Double-End Milling and Centering Machines, Automatic Thread Grinders, Optical Comparators, Automatic Opening Threading Dies and Chasers, Ground Thread Flat Rolling Dies.

COUPON

JONES & LAMSON MACHINE COMPANY
DEPT. 710A, SPRINGFIELD, VERMONT, U.S.A.

Please send me your handbook "Thread Elements & Formulas", and complete information about your Threading Dies.

NAME_____

TITLE_____

FIRM_____

ADDRESS_____

TA

Dear Editor:

PREMIUM PRICES FOR STEEL

Sir:

It is becoming increasingly evident that many persons engaged in the distribution of steel have fallen into the vicious practice of quoting prices on the basis of whatever the traffic will bear. Unfortunately, many of the firms doing this sort of thing have not been regularly engaged in the distribution of steel products. . . . The newcomers in this business are not the only ones who are trying to take while the taking is good. There are also some old established warehousers who have fallen into the malpractice of paying little attention to present and future customer relations. There is no question about the short-sightedness of this action.

We in the steel warehousing industry have a responsibility above and beyond profits for the current year. Distributors with a long range point of view can best serve their own interests and those of their stockholders by paying less attention to today's unusual opportunities and more attention to their customer's problems. There is no trick to selling material at exorbitant prices when such material represents the very sustenance to potential buyers. The trick is to restrain yourself from selling at exorbitant prices when the opportunity is there to do so. During the existence of OPA, many steel distributors brazenly created a black market by charging illegal and excessive prices. Since the removal of price regulations on steel, this practice has been carried on openly. Prices being quoted depend entirely upon the supply and demand for that particular item and have been known during this period to range from double the regular price to four or five times what the price should normally be.

No one can question certain increases made necessary by legitimate increases in costs. What must be guarded against, however, is unnecessary inflationary increases in prices —for excessive profits. Such exorbitant prices are reflected in our national economy in the price of consumer products with resultant additional demands by labor and the inevitable, vicious circle that follows. Fortunately, there are many in the warehouse industry who will have no part of this catch-as-catch-can philosophy. Their reward for this sound philosophy of business comes with a continuation of good business relations with customers with whom they have kept faith. Our company has proof of the value of keeping faith with customers. In 1941 we made a statement which appeared as an advertisement in trade publications and read in part: "We have never charged a premium for any material from our warehouse stock. . . . We pledge never to deviate from this policy. . . ." This still is and will continue to be our policy. The prestige of this industry is at stake unless all of us in this business recognize that a few extra dollars at this time are less important than continued good will.

S. M. LEVINSON
President
Levinson Steel Co.
Pittsburgh

MICROFILM

Sir:

In the Jan. 16 issue there is an article entitled "Microfilm as an Engineering Tool." In the article is described the Recordak unit used by the Timken Roller Bearing Co. I wonder if you would be kind enough to supply information so that I might contact the manufacturer of the unit.

JOHN F, KAHLES
Associate Professor
Metallurgical Engineering
University of Cincinnati
Cincinnati

● Questions regarding the use of the Recordak can be directed to Mr. Baird F. West, Eastman Kodak Co., Rochester 4, N. Y.—Ed.

TRANQUIL P.A.?

Sir:

As has probably been told you time and time again, the life of a purchasing agent is none too tranquil at best, what with the still existent shortages of this, that and the other things so vital to industry. I must add my few words of praise to the swell job your magazine has been doing, not only in distributing new "know hows" to the industry but also in keeping us up to date in relation to modern equipment. Naturally this compliment is all leading up to a favor, but I feel that I can place my faith in you people and find it rewarded. I certainly would appreciate four "Chart of Comparable Tool Steels" and if possible two "Directory of Tool Steels." I find these a great asset in my work, but somehow my copies have turned up short.

ARNOLD J. MAYER
Tremont Tool & Gage, Inc.
Cleveland

SILICONE-BASE ENAMEL

Sir:

I am very much interested in the silicone-base heat-resistant baking enamel mentioned in the "Newsfront" of the Feb. 6 issue. We use a large amount of baking enamel on aluminum products and are always interested in anything which might improve the quality of our products. We would therefore appreciate it if you could furnish the name and address of the manufacturer of this material.

E. J. HUNTER
Hunter Engineering Co.
Riverside, Calif.

● Dow Corning Corp., P. O. Box 592, Midland, Mich., can supply additional information.—Ed.

COPPER FROM MT. ISA

Sir:

Many of us in this department read your magazine regularly and appreciate very much the high standards set by the many excellent articles and news reports published in this periodical. In the interest of accuracy, however, I should like to draw to your attention a mistake which appears on p. 115 of the Jan. 23 issue. In the group of pictures relating to alluvial tin mining in Australia, the excellent picture of the head frame, smelter, and power house at Mt. Isa Mines, Queensland, recalls to me the years I spent at Mt. Isa during the construction and early operation of this plant in 1929-34. The photograph shows the knoll on top of which the head frame is built, and waste rock dump, but the slag dump situated on the far side of the smelter does not appear in the picture. The principal point of difference, however, is that Mt. Isa was for some years, subsequent to 1931, one of the largest producers of lead, has also produced zinc concentrates, and during the last 5 years has developed an extensive copper ore body from which copper is now being produced in this smelter, the lead production having been suspended. There is, to my knowledge, no record whatever of any production of tin at this plant. This comment is not intended to be critical, but I thought you would be interested in having the correction drawn to your attention.

F. A. FORWARD
Head of Dept. of
Mining and Metallurgy
University of British Columbia
Vancouver, Canada

KIRKSITE DIVISION

Sir:

In your Jan. 23 issue we note on p. 133, the Kirksite Div., 111 Broadway, New York. We wrote them at that address and the letter was returned to us marked "not at address given." Will you kindly advise if you have a better address for this company?

JESSE G. HAYDOCK
E. J. Rooksby & Co.
Philadelphia

● Maybe if you re-address the letter as Kirksite Div., National Lead Co., 111 Broadway, New York 6, it will be recognized as one of the big companies in that particular building. That is the correct address.—Ed.

T&W *Familiar Roadmark*

● Industry's drive to combat rising costs with new production efficiencies is centering more and more attention on the long list of advantages of steel stamping parts. Many of the nation's users know that one reliable guidepost on the road to complete parts economy is the familiar Transue trademark. Transue offers the following advantages in quality and service on deep drawn stampings: expert consulting service on product design without obligation—unvarying high stamping quality with uniformly close tolerances—faithful attention to delivery requirements. Why not call in a Transue specialist to discuss your possibilities of new efficiency with T & W parts.

TRANSUE & WILLIAMS
ALLIANCE, OHIO

Designers and Makers of Deep Drawn Stampings

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, DETROIT, INDIANAPOLIS, CLEVELAND

Industrial News Summary...

- ***Inflationary Scrap Rise Continues***
- ***No Downward Trend in Sight as Yet***
- ***Lower Steel Prices a Probability***

THE inflationary spiral in iron and steel scrap prices was not stayed last week and the upward movement continued this week at major consuming centers. In an effort to forestall a movement of scrap out of the Pittsburgh district, prices were higher there this week and similar conditions applied at Chicago, Philadelphia, Cleveland and Youngstown.

Despite the increase in the so-called local scrap prices, differentials still exist between these quotations and delivered prices on scrap originating outside consuming districts. This is especially true in the case of scrap moving from eastern points such as New York and Boston into the Pittsburgh area. As a result of price changes during the past week THE IRON AGE scrap price composite comprising the average of heavy melting quotations at Pittsburgh, Philadelphia and Chicago moved up from $36.67 a gross ton to $38.75, a gain of $2.08 a gross ton.

The currently high scrap market, although exceeded in one or two instances in the past, represents a new peacetime level when the period of time during which the higher prices have applied is considered. Because other pig iron producers followed the increase in pig iron prices made a week ago by many makers, THE IRON AGE pig iron composite price is up this week to $33.15 a gross ton from last week's figure of $32.23. an advance of 92¢. The total advance from the level which existed before increases were made amounts to $3 a ton.

BECAUSE scrap prices today are dictated entirely by free market conditions and the gyrations accentuated by intense competition among steel producers, there is no indication this week as to when a price reaction may be expected to set in. Efforts by the government to unloosen WAA surplus equipment which will be classified as scrap are under way, but some time may elapse before such action furnishes aid to scrap consumers or may be expected to affect scrap prices. Meanwhile steel producers are finding their steelmaking costs mounting rapidly because of scrap costs.

While higher scrap costs may have some bearing on the final outcome of wage negotiations, the total effect may not be in proportion to the current magnitude of the scrap problem. Furthermore, increased living costs which are also expected to be temporary will match the temporary high level in scrap quotations as bargaining factors.

Despite the need for immediate action and despite the dependence of a great number of steel producers and steel consumers on the outcome of the wage negotiations between the U. S. Steel Corp. and the steel union, no final action will be taken until the portal-to-portal problem has been definitely settled by Congress. The company and the union have only about six more weeks in which to reach a satisfactory agreement.

WHEN the portal-to-portal issues are settled, the steel corporation and the USWA will without doubt reach a quick agreement unless some unusual change in the current temper of both sides occurs. It is still a good probability that before the final agreements are reached, the steel company will make some move reflecting a moderate decrease in the delivered price of steel while at the same time conceding a moderate wage increase with some of the social benefits demanded by the union.

The steel industry this week reaches a new peak in steel ingot operations with the rate at 95.5 pct of rated capacity up 1½ points from last week's revised rate of 94 pct. With cold weather apparently out of the way, the industry will probably soon reach 96 pct or slightly higher. If scrap collections pick up, it may go even higher.

The exceedingly heavy demand for steel products, the box car shortage and the disruption of some finishing mill schedules because of cold weather leads to the conclusion this week that the tightness in the supply of major steel products will continue for several months at least. Even though inventories are unbalanced and in the aggregate heavy at some points, fresh demand for steel continued unabated this week.

Only in a few products is there any sign of a balance between supply and demand. The pressure on stainless steel output and deliveries has eased significantly in recent weeks. Delivery time on polished sheets, the most critical item, has been reduced to 2 to 3 months by most producers. In one instance a producer can offer delivery in a much shorter time in adjacent markets. This situation has caused stainless makers to concentrate on new market studies, the acquisition of new customers and the better servicing of older ones.

MAJOR producers of pig iron are now quoting prices on a 30-day basis, the rapid fluctuations in the scrap market and the extremely tight position of pig iron having caused them to abandon the former quarterly pricing basis. All pig iron producers have for several months been shipping on an f.o.b. furnace price which, in the present dire shortage, has made the pig iron basing point setup meaningless.

During the worst of Britain's winter crisis steel output was cut almost one-third. The reduction was due to a combination of fuel, transport and power shortages. In an attempt to make up some of the lost steel production in Great Britain negotiations were virtually completed this week with the unions for the British steel melting shops to work a 7-day week thus replacing the old 24-hr break system in the industry.

• **BRITISH PLIGHT**—The British steel output dropped almost one-third at the worst of the winter crisis. Reduction was due to a combination of fuel, transport and power shortages. The government is still not in a position to guarantee fuel allocation to steel industry for the second quarter. Industry will probably get about 75 pct of demands. British need for imported semi-finished steel is intensified by production drop. This reduces exports still further thus reducing steel profits. Production has not as yet recovered as Midlands and North England are still paralyzed with snow, and coal movements are down. Steel consuming industries are going on a 2-day shift basis from single shifts in order to reduce peak power demands.

• **SCRAP CONSUMPTION**—Consumption of iron and steel scrap by the steel industry in 1946 totaled 43,442,000 gross tons. This consisted of 20,435,000 tons of purchased scrap and 23,007,000 tons of home scrap.

• **STEEL INGOT OUTPUT UP**—Production of ingots and steel for castings in February, 1947, was 6,430,674 net tons. Operations during February averaged 91.9 pct of capacity according to the American Iron & Steel Institute, reflecting lower activity than had been scheduled due to material shortages preventing realization of original schedules. As a result, weekly production during that month averaged 1,607,669 net tons, as compared with a weekly average of 1,628,144 net tons during January.

• **ANOTHER WAGE STUDY DUE**—Following through on the report of the Advisory board of the Office of War Mobilization and Reconversion on the guaranteed wage, President Truman has asked the Council of Economic Advisers and the secretaries of Labor and Commerce to make a broader study of the economic implications of the guaranteed wage. The major portion of the study will be conducted by the Council of Economic Advisers, headed by Edwin G. Nourse. The advisory board in recommending further study of the plan in a recent report stated that guaranteed wage plans should not be the subject of legislative action, but made clear the responsibility of the government for maintaining a continuing study of the guaranteed wage and for supplying data and information to those interested in wage guarantees.

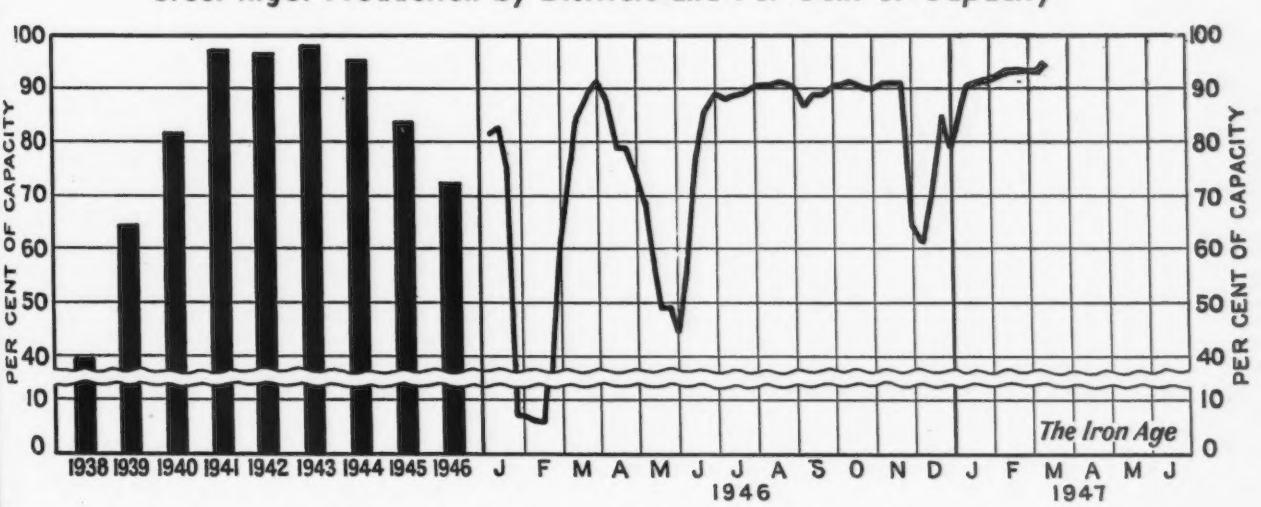
• **OLD CARS**—A recent survey showed that there are about 24 million cars "2 years old or older" on the roads whereas in 1940 only 19,500,000 were in this classification. In this category cars start to come into the market for replacement tires, according to tire industry sources.

• **CANADIAN NAIL OUTPUT**—Canadian nail production last year was more than 15 pct below the total for 1945. During 1945 a total of 59,865 tons of nails were produced in Canada. Output of steel wire staples amounted to 1725 tons compared with 2070 tons in 1945 and tacks of steel, brass and copper amounted to 2303 tons compared with 2207 tons in the previous year. Production of iron and steel nails in December amounted to 5835 tons, which was slightly below the 6094 tons made in November, but well above the 3092 tons reported for October. December production of wire staples was 107 tons and tacks of steel, brass and copper, 178 tons.

• **CAR REGISTRATION IN 1946**—New passenger car registrations in 1946 totaled 1,815,196 and new trucks registered numbered 625,249, according to R. L. Polk & Co. These figures compare with 3,731,166 new passenger cars and 640,697 new trucks registered in 1941, which was the last full year of automotive production prior to the war. Because of record manufacture and sale during the last quarter, the total trucks registered during 1946 nearly attained the prewar registration of 1941. During December 69,453 trucks were titled—more than any one month in 1941. In October a record-breaking 74,708 new trucks were registered, Polk said.

• **BRITAIN GETTING FOREIGN LABOR**—Efforts to alleviate the manpower shortage in Britain through the employment of foreign labor are beginning to reach the stage of actual agreements between the government and trade unions, who have fought the move. The British National Union of Blastfurnacemen has agreed to accept Polish labor (ex-British Army) if British labor is not available up to 5 pct of total employees in any firm. Efforts which have spread over several months to get Italian labor into British foundries are said to be meeting with difficulty as the British Treasury will permit the workmen to transfer only $40 per month to Italy.

Steel Ingot Production by Districts and Per Cent of Capacity



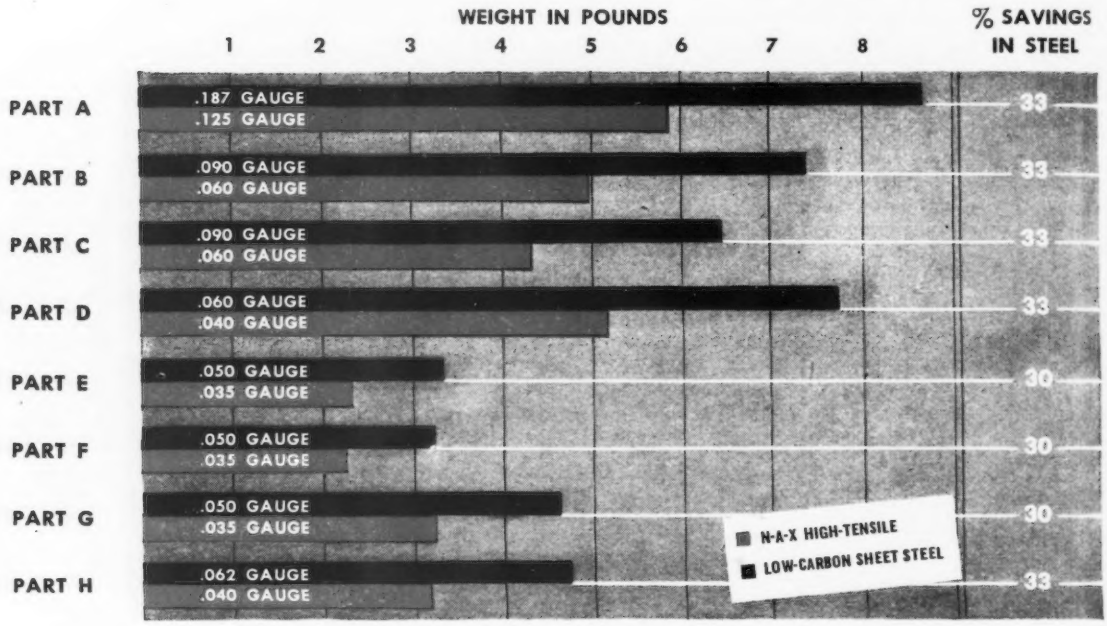
Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 4.....	96.0*	93.0	90.0	90.0	95.0	96.0*	100.0	99.0	102.5*	103.5	103.0	76.5	95.0	94.0*
March 11.....	98.0	94.0	90.5	90.5	95.5	104.0	80.0	99.0	104.5	105.0	96.5	76.5	105.0	95.5

* Revised.

THE NEW ARITHMETIC IN STEEL

ACTUAL PRODUCTION FIGURES MORE THAN PROVE IT:

3 TONS N-A-X HIGH-TENSILE > 4 TONS CARBON SHEET STEEL



We have claimed that N-A-X HIGH-TENSILE can effect a 25% saving in steel. This graph shows the results when one leading manufacturer switched from carbon steel sheets to N-A-X HIGH-TENSILE . . . utilized thinner sections with no sacrifice of strength . . . and saved up to 33% in steel.

The change was made because of the unique combination of properties of N-A-X HIGH-TENSILE. With its 50% higher physical properties, it has exceptional formability for a high-strength steel, and can be formed and drawn into intricate shapes with little or no change in dies or machinery adjustments. It has excellent weldability, great impact toughness, high fatigue- and corrosion-resistance. These qualities not only provide a more durable product, but often effect economies in fabricating and handling. Based on *over-all costs,* N-A-X HIGH-TENSILE compares favorably with carbon sheet steel.

Today's supply of N-A-X HIGH-TENSILE is insufficient to meet the demand, but we are looking forward to the day when we can fill your needs. When that time comes, our engineers and metallurgists will be glad to work with you to determine just how much steel you can save by using N-A-X HIGH-TENSILE.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

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"Mysterious Strangers" Offer Vast Quantities of Steel

But Survey Shows Attempts To Get Delivery Generally Vanish in Thin Air

o o o

By WALTER G. PATTON
Detroit Regional Editor

o o o

Detroit

• • • "Everybody wants to get into the act!"

That's what Detroit purchasing agents are telling each other—and their steel suppliers—about steel selling. The complaint stems of course from the fact that during the past several months steel buyers here, almost without exception, have been deluged with offers to furnish thousands of tons of flat-rolled steel by sources heretofore unknown.

One steel buyer explains the situation this way:

"The fact that these offers come mostly from self-styled steel brokers we never heard of or from commission merchants, manufacturers agents, ex-politicians or "scrap interests" that are complete strangers to us—and even from the driver of a dry cleaner's truck—seems to make little difference to the "Boss."

"All the 'Boss' seems to know about such deals is that Joe Bloke at the Repast Club has been offered 50,000 tons of flat-rolled and he wants me to get in on such offers, too. Pay the price and get the steel," he says, "—anything to keep the plant going. Run down any offer that looks good and report back to me what you find out."

In case such a report has not yet reached the Boss' desk, he may wish to review the results of a recent survey of steel buyers in the Detroit area.

This survey was made to determine the results—if any—of efforts to buy steel from the mysterious strangers who have been offering flat-rolled products to Detroit industrial plants at twice and even three times the market price.

(1) It is reported that General Motors has had an offer to furnish a million tons of cold-rolled steel.

(2) A Detroit manufacturer of auto bodies has received an offer to furnish 50,000 tons of steel per month which appeared to be sufficiently genuine to warrant sending a representative of the company to New York for two days to attempt to negotiate a contract.
(A detailed account of the steel buyer's experience and the terms of the offer are given below.)

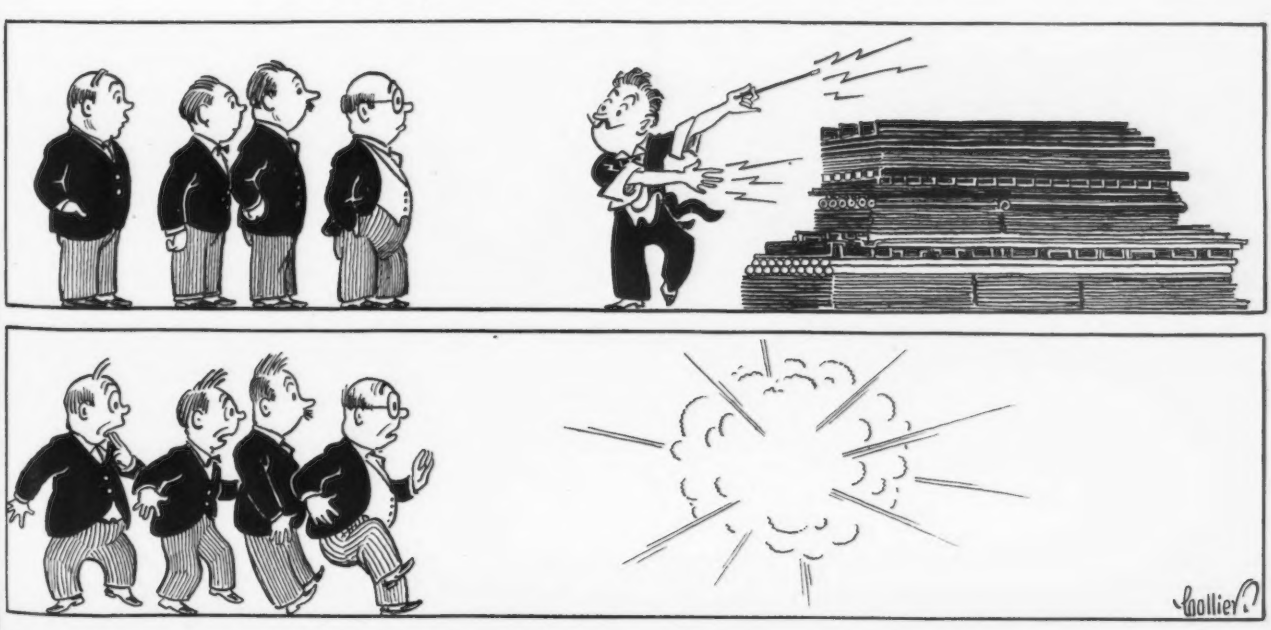
(3) Within the past few weeks the president of a large motor car company received an offer from the alleged representative of a "scrap interest" who claims to be in a position to furnish 500,000 tons of cold-rolled steel over a period of 3 years. The steel, according to the alleged spokesman for these interests, would come from "one of the three major steel companies." (The reply given was that the motor car company wanted no part of any such deal.)

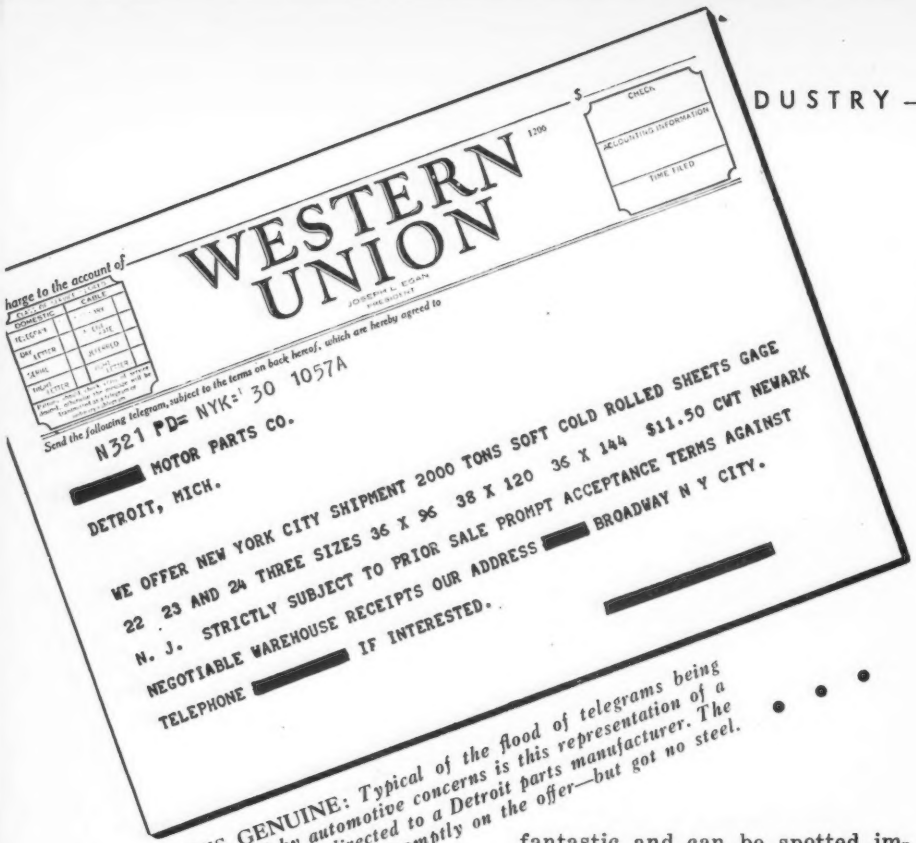
(4) At least one telephone call-collect-from Miami, Fla., has been received by a motor car producer from some well-wisher anxious to alleviate the automobile steel shortage.

(5) A "broker" in a dingy downtown office claims to be in a position to furnish 25,000 tons of cold-rolled steel within 90 days at $48 over the published price.

(6) At least one motor car producer has been approached on a proposition to trade sheet steel for finished auto-

Now you see it—now you don't





WESTERN UNION

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

N321 PD= NYK= 30 1057A

[redacted] MOTOR PARTS CO.

DETROIT, MICH.

WE OFFER NEW YORK CITY SHIPMENT 2000 TONS SOFT COLD ROLLED SHEETS GAGE 22 23 AND 24 THREE SIZES 36 X 96 38 X 120 36 X 144 $11.50 CWT NEWARK N. J. STRICTLY SUBJECT TO PRIOR SALE PROMPT ACCEPTANCE TERMS AGAINST NEGOTIABLE WAREHOUSE RECEIPTS OUR ADDRESS [redacted] BROADWAY N Y CITY. TELEPHONE [redacted] IF INTERESTED.

LOOKS GENUINE: *Typical of the flood of telegrams being received by automotive concerns is this representation of a wire recently directed to a Detroit parts manufacturer. The Detroit firm acted promptly on the offer—but got no steel.*

mobiles. Made by an alleged "scrap source," the offerer has given consideration to the possible effect of such an agreement on the motor car business; he guarantees to sell all the automobiles received in the deal outside the continental limits of the U. S. Thus he will not constitute a threat to U. S. dealers, he says. (The offer was, of course, rejected.)

(7) A young girl who has been described as a "beautiful blonde not without personal charm" and reasonably well-equipped with a new vocabulary of steel industry terms has recently advised a Detroit manufacturer's representative that as the agent of a Cleveland firm she (a) has just sold an automobile producer 30,000 *tons* of copper, (b) could accept an order for 200 tons of cold-rolled 20 gage 42 x 96 at $215 per ton, (c) can also furnish fractional horsepower motors at $20 each and (d) expected soon to be able to furnish substantial quantities of spring wire. Aside from the fact that she may have established a new high in versatility and may have confused 96-in. bed sheets with 92-in. steel sheets, the girl was reasonably well-informed, the manufacturer's representative said.

While a number of such offers are obviously in the realm of the fantastic and can be spotted immediately as figments of somebody's imagination, others are convincing down to the final detail where all appear to break down—the seller declines to name the steel mill or to guarantee either quality or delivery of the material. This was one snag, for example, that finally hung the deal about to be described.

According to the purchasing agent of a Detroit concern, the following offer was made in the offices of a New York exporter located on Broadway. The offer was made, it is said, in the presence of an attorney and an industrial consultant, the latter with offices on Fifth Ave. in New York.

The original lead in this case came through a Detroit industrial concern which arranged a meeting for the prospective steel buyer with the alleged representative of the steel seller in the lobby of a prominent New York Hotel.

The offer as outlined to the Detroit buyer is reported to cover the entire output of a mill located in the Pittsburgh district for the balance of 1947. Steel was to be furnished at the rate of 50,000 tons per month starting in April and to consist of "all cold-rolled, commercial or deep drawing quality sheets or a combination of cold-rolled and hot-rolled sheets 14 to 26 gage."

At the buyer's insistence, the attorney for the seller made a telephone call during the negotiations presumably to the mill, to obtain information as to the quality and type of material available and maximum width the mill was able to furnish.

The steel was offered at published prices plus $30 per ton, f.o.b. the mill, which would increase the Detroit price over mill price by approximately $34 per ton.

In addition to the 1947 tonnage, the prospective buyer was asked to sign a contract for 20 pct of his requirements during 1948 and 1949 at a price of $10 per ton over the published price plus 1½ pct broker's commission. This steel would be billed, it is reported, by the mill at the published price plus $10 per ton, sight draft bill of lading. The extra $20 per ton during 1947 was to be set up as a separate deal with the broker, details to be worked out later.

Proposed financial arrangements included an irrevocable letter of credit drawn on a New York bank. The purchase order was to be made out so as not to show the name of the steel supplier which was to be filled in "after the mill had accepted the order."

The seller also expressed an interest in the prospective buyer's requirements for strip and plate steel, it is reported.

No positive proof was offered, the prospective buyer indicated, that the seller either controlled or had access to the quantity of steel under consideration although the reputation of the firms and people involved and their obvious familiarity with customs of the trade gave every indication that the offer might be genuine.

Prices asked for steel sold here in Detroit by brokers varies over a wide range, but have tended to fall noticeably from the $180 to $210 quoted as recently as a month ago. One recent offer for 18 to 26 gage involving 100,000 tons is $42.50 over the regular mill price plus $4.30 per ton to offset the difference between the actual and arbitrary freight. In this particular case, it was stated the mill would bill the material directly at $15 per ton over the mill price while the broker would render an additional billing at $27.50 per ton which the broker states, covers his commission of $5 per ton and "a split with certain individuals."

In another offer said to involve

500,000 tons over a 3-year period the steel would be billed at $13 over the market quotation of which $9 would appear on the invoice and the remaining $4 would be split supposedly among the agent and the "scrap interests" the agent was supposed to represent.

A steel buyer who has been following what he calls this "Open the Door Richard" market for steel for the past 9 months says that he has yet to obtain any steel although he has followed every offer that has come to his attention. Prices, he reports, have been quoted as high as $280 per ton. In each case, he said, he has accepted the quoted price but has insisted on actually seeing the steel.

Among a number of offers received is one allegedly "from one of the largest mills" also covering a period of 3 years. The price the first year would be mill price plus $55 plus $3. Suggested price for subsequent years is mill price plus 3 pct plus $3.

Such offers have been followed this source states, in Chicago and Washington as well as Detroit. Except for an odd car of steel, the buyer has never heard of steel actually being purchased from these fly-by-night steel brokers.

Managers of steel company offices here have received numerous complaints from their customers concerning the activities of certain steel brokers and several have made careful investigations of such offers. In one instance, when three of his customers reported receiving a letter from a broker operating in downtown Detroit, the district manager decided to investigate the case personally.

He found the broker operating from a dingy office in an obscure downtown office building. The office in this case was dirty and threadbare and the negotiations went rather badly.

In this instance, the offer to furnish steel covered 25,000 tons out of a 100,000-ton deal. Selling price was to be $48 over the market price which in Detroit is not too far out of line with warehouse prices. Steel was to be delivered in 90 days with payments to be made through a local bank.

Identifying himself properly as to his steel company connections and as the appointed agent of three prospects who had received offers from the broker, the district man explained that he was prepared to buy steel on behalf of his clients at the offering price provided the name of the steel producer was disclosed and the quality of the steel guaranteed. The deal is ready for closing but the name of the mill has not yet been furnished although three weeks have elapsed since the contact was made.

While a number of explanations have been offered to account for the weird activities of some of the steel brokers operating in this territory, none of the explanations seems to be entirely adequate. Since almost none of the agents offering steel asks for a deposit or down payment, the hit-run explanation falls flat. Most frequent explanation offered is that the brokers may be hoping to get firm orders for steel which might be filled later at lower prices in case a business recession is experienced in this country during 1947. The fact that an ever-increasing tonnage of electric furnace steel is being processed into sheets and made available to the trade through broker channels offers another possible explanation for the unprecedented interest in the steel brokerage business. Nothing so far disclosed, however, can explain adequately the huge tonnages of steel that are supposed to be covered in the offerings.

With a government inquiry into the subject of steel and scrap prices being considered (THE IRON AGE, Feb. 27, p. 96) and a governmental agency known to be inquiring into the activities of at least one Detroit scrap dealer, it may happen that the activities of some steel brokers will soon be seriously curtailed. For many steel buyers and mill representatives in the Detroit area, grown weary running down fantastic offers to furnish sheet steel at fabulous prices and finding that such offers invariably vanish into thin air, the end of such shenanigans can hardly come soon enough.

The present plight of steel-hungry buyers in the automotive industry has been likened to that of a farmer who was trying to follow a poorly defined wagon road leading to an unknown destination. As he went along, the farmer noted that the road grew narrower and narrower, and finally deteriorated into a squirrel track that ran up a tree.

One Way to Do It

Detroit

• • • It has been reported that a Detroit firm operated during the war has managed to obtain steel under quota allotments from steel suppliers although this firm has not operated since the expiration of its war contracts. By selling the steel thus obtained at prices far above the market it is reported that this establishment earned more during 1946 than it earned during 1945 while manufacturing operations were being carried on. Some steel suppliers here are reported to be instructing their salesmen to go into customers' shops to see that steel supplied is actually being used in manufacturing operations.

Lansing Drop Forge Co. Announces Adoption Of A Profit-Sharing Plan

Detroit

• • • A profit-sharing plan based on attendance, earnings and seniority has been adopted by Lansing Drop Forge Co., according to E. M. Refior, president of the company. The company has been working on the details for almost a year, Mr. Refior said.

One-third of the net operating profit, after payment of federal taxes during each calendar year, will be apportioned under the plan to workers listed on the payroll as of the last day of the year. This year the plan will be retroactive to Jan. 1, according to Mr. Refior.

Employees laid off during the year or who went into military service, or who were forced to leave their jobs because of illness, will share in the profits for a given year, provided they send a written request to the company between Dec. 1 and Dec. 31.

Under the present plan, a worker gets an attendance unit for each regular work day or a possible 260 units per year. Saturdays and Sundays are not counted as units, because premium pay is given for working on these days. A similar system of units is used, based on each employee's earnings and his seniority, and the total number of such units determine how much money he will receive under the plan.

Congressmen Differ On Effects of High Court Decision in Lewis Case

Washington

• • • **Differences of opinion** prevail in Congress regarding the Supreme Court 7 to 2 decision which slapped a $10,000 fine on UMW President John L. Lewis and a $700,000 fine on the union for contempt. This action upheld a decision by Justice Goldsborough of the District Court for the District of Columbia, except that the lower court's fine against the union was $3,500,000.

This reduction was on condition that Lewis withdraw the original strike notice. UMW counsel has filed a motion seeking to have this time extended, pleading that this did not permit time to decide whether to ask for a rehearing. Normally, about 25 days would be required for the high tribunal's finding to officially reach the lower court and rehearing may be asked at any time during this period.

While the Supreme Court's decision was generally applauded in Congress it created mixed feelings as to what the effect would be. Mr. Lewis is unpredictable, yet it is expected that he will live up to his "truce" and keep the mines going at least until Mar. 31 when the "truce" ends. He said, however, that he would act "within the limitation of the findings of the Supreme Court of the United States." On this basis it is assumed he will at least negotiate with mine owners without calling a strike up to the time the government turns the mines back to private owners at midnight June 30.

Support is given this assumption through the UMW statement that granting of the additional time to comply with the high court's orders would not "adversely affect" the ruling or operation of the mines.

Consideration already is being given by both the House and Senate Labor Committees to specifically state that the Norris-LaGuardia anti-injunction act does not apply to the government, just as the majority Supreme Court decision said. It said so because the injunction against Lewis and the UMW was obtained through that law which bars uses of the injunction by private employers. UMW attorneys had argued that the Norris-LaGuardia act applied to the government as well as to private employers. The Congress apparently intends to make it clear that, as held by the Supreme Court, the law does not apply to the government.

But members of Congress are discussing the question of what Mr. Lewis may do if this provision is clearly stated in labor legislation. Some think, while others do not, that Mr. Lewis, once the mines are returned to private owners, might declare a strike. In order to avoid a national disaster it seems evident that the mines would be returned to the government and the law applied to permit injunctions and fines. Thus the mines would be socialized and if they should be, the natural inquiry is whether or not other basic industries, such as steel, might not also be taken over by the government if labor negotiations with private owners failed.

Both the administration and the vast majority of members of Congress are strongly opposed to either government ownership or operation by private owners. That is also true of labor leaders like Mr. Lewis, AFL president William Green and CIO president Philip Murray. Yet if they proved unyielding in their demands there is speculation whether they would let the government take over basic industries, probably followed by similar action respecting less essential industries.

Members of Congress who are pondering over these questions concede that they may be overworking their imaginations yet they insist there are possibilities that they may not be entirely off of the right track.

Despite the general acceptance of the soundness of the Supreme Court decision it is widely admitted that it has made labor bitter, so much so that it might go to extremes that otherwise would not have led to the government taking over industries. Another matter commented on is whether out of its strong distaste for the decision, labor will slow down on production.

Lending emphasis to the bitterness of Mr. Lewis were portions of his testimony before the Senate Labor Committee following the court decision in which he accused the government of using the courts as a blackjack. He refused to comment when asked directly what would happen when the operators take back the mines after expiration of the Smith-Connally Act.

"I have no answer to that," he said. "The effect of the executive, judiciary and legislative branches of the government has been to effectively arrest collective bargaining in the coal industry."

Free Enterprise vs Taxes

Washington

• • • On the average, people are working one day in three for the government. I do not see how free enterprise can survive under such conditions . . . In the upper brackets, with a tremendous tax, people are deterred from putting money into risk enterprises. They would rather put it into government bonds and receive 1 pct than to take a chance on losing it in projects that would put people to work and develop industry. It is far better . . . to take a safe return and not go into a game in which, if they lose, they lose their own money, or if they win, the government takes it all away from them . . . Many corporation executives feel that it is useless to work any harder. They would rather go to Florida and earn less because the government takes practically all the additional money they can earn.

—Sen. Robert A. Taft Remarks on the Senate Floor Feb. 28, 1947.

WAA Offers Magnesium Foundry in Chicago Area

Washington

• • • **WAA is offering** for sale or lease a modern foundry in Chicago, equipped to produce 350,000 lb of large magnesium sand castings per month. Formerly operated by Howard Foundry Co., Inc., the plant cost the government $2,585,000 including equipment and machinery. Credit terms may be arranged.

Written proposals, addressed to WAA Office of Real Property Disposal, P.O. Box 1085, Chicago, must be received by 3 P.M. (CST), Apr. 15, at which time they will be publicly opened and read. Specific information may be obtained from the WAA Regional Office, 327 S. LaSalle St., Chicago, and proposal specifications from any WAA regional office.

See No Prospect For Pig Iron Allocations Despite New Pressure

Washington

• • • **Despite demands from** foundries **and other users of pig iron** for restoration of allocations and priorities every indication points to the fact that there will be no change in the present situation. As it now stands pig iron producers, like steel producers, have accepted a voluntary plan to provide allocations for housing after Mar. 31. Otherwise, according to an order issued by John R. Steelman, assistant to the president, after Mar. 31 government allocation of pig iron will be discontinued for all items except cast iron soil pipe.

Priorities and allocations, except for housing items, have been under the jurisdiction of CPA which goes out of business after Mar. 31 government allocation of event of continuation of the Second War Powers Act under which OTC, which includes CPA, operates. A deficiency appropriation bill now going to conference would fold up OTC and CPA shortly after that date. It does this by shutting them off from additional funds. While there is still authority under the Veterans Emergency Housing act to allocate materials, the Housing Expediter has stated that this authority will not be used if the limited voluntary plans are successful.

There is no prospect at all that Congress would authorize some other government agency to issue allocations and priorities such as CPA did.

Alien Property License Output $100 Million

Washington

• • • **American production** in 1945 under patents licensed by the Office of Alien Property exceeded $100 million, it is reported after analysis of the reports of more than 800 licenses.

These were patents issued to nationals of enemy countries which were seized by the government after Pearl Harbor. Nearly every branch of American industry is now making use of the patents, the Alien Property Custodian said, and nearly half have been issued to small businesses.

At the same time, it was announced by the Dept. of Justice that the OAP will have a patent exhibit at the Southern Machinery and Metals Exposition which will be held at Atlanta, Apr. 14-17.

The patent booth will feature abstracts of about 33,000 alien patents.

Government Agencies Renew Drive to Move Scrap Into Industry

Washington

• • • **To bolster lagging** domestic scrap supplies the War Dept. announced that it is offering 188,000 tons of battlefield scrap in Europe and WAA opened a drive to convert its inventories of obsolete and unsaleable machine tools into scrap.

As pointed out by THE IRON AGE **(Dec. 12, 1946, p. 117), the War** Dept. is now permitted to sell European and Pacific battlefield scrap to American buyers for shipment to this country. However, no offerings of scrap have been made in the Pacific in recent months, due to the bulk purchases of surplus property made by the **Chinese and Philippine governments.** Any scrap available in the Pacific would come from Hawaii, **Korea or Japan.**

In Europe the War Dept. has announced that the following offerings of unprepared ferrous scrap have been made since the issuance of the December directive:

Location	Amount, Tons	Bids Close
Austria	8,000	Mar. 18
Germany	150,000	Mar. 31
Austria	30,000	Apr. 2

Prospective bidders on European scrap should address inquiries to the Commanding General, U. S. Forces, European Theater, Frankfurt, Germany.

WAA could make no estimate as to the amount which would become available. The bulk of overage and obsolete tools suitable for this purpose have already been disposed of, it was said.

However, the disposal agency is now scanning more closely the single and special purpose machine tools which were originally set aside for possible standby status for the armed forces. Those which the services have turned back will be offered for "salvage."

It has been estimated by OWMR, however, that as much as 300,000 tons of scrap might be provided by WAA over the next 2 months. Also, John R. Steelman, Assistant to the President, has estimated the amount of scrap which might be derived from all government sources during 1947 at about 1,250,000 tons.

COALMEN CALM: *News of the Supreme Court decision against John L. Lewis and his United Mineworkers had various reactions in the coal fields. Jacob Penter (left) and Mike Kalemsky took the news calmly at Bridgeville, Pa., but all sources agreed the miners would continue to obey any orders the chief handed down.*

House Committee Okays 4¢ Per Lb Import Tax Suspension on Copper

Washington

• • • **A rewritten** bill which would suspend until Mar. 31, 1950 the 4¢ per lb import excise tax on copper has been approved by the House Ways and Means Committee.

Previous measures seeking to reduce or repeal the tax outright were discarded. Another feature of the revised version also provides that for the same period the tax shall not apply to copper withdrawn from warehouses after the enactment of the bill.

Backers of the measure will press for swift action in view of the present shortages of this metal, it was said. Government sources estimate the 1947 copper supply at around 1 million tons; while this represents an increase of more than 100,000 tons over 1946, it will fall below 1947 requirements.

Barring work stoppages, such as those in 1946 which are estimated to have cost nearly 200,000 tons of production, it is expected that there will be about 965,000 tons of domestic refined copper of which about 45,000 tons is secondary copper passing through primary refineries.

In addition, it is expected that there will be available during the first quarter 1947 some 30,000 tons purchased abroad for which commitments were made prior to termination of the public purchase program in November.

In comparison with the 700,000 tons released from government stocks last year, there is now in sight only about 125,000 tons which the OMR could perhaps make available this year.

Suspension of the import excise tax is expected to increase supplies since most fabricators are unwilling to pay the extra 4 ct on top of the prevailing price which has been running around 22 ct per lb.

Need for increased supplies from foreign sources is also seen in the fact that while the manpower situation has improved, it has not kept pace with postwar demands for copper; wage increases have not attracted the additional workers needed in the mines.

Allegheny Ludlum Ups Stainless Steel Output

Pittsburgh

• • • **Although combined** production of all products was lower than during war years, due to lost production during last year's industrywide steel strike, stainless steel production totaling more 140,000,000 lb was the highest in Allegheny Ludlum Steel Corp.'s history, according to H. G. Batcheller, president.

Net earnings in 1946 were $6,599,346, equivalent to $5.12 per share of stock. Net sales and revenues amounted to $95,277,573 for the year, compared with sales and revenues of $100,401,059 for 1945.

Cleveland-Cliffs Buys Harvester Ore Mines On the Mesabi Range

Chicago

• • • **The Wisconsin Steel Ore Mines,** on the Mesabi range near Hibbing, Minn., a division of the International Harvester Co., was sold to Cleveland-Cliffs Iron Co. on Mar. 1. The company will sublease to Cleveland-Cliffs the Agnew, Hawkins and Sargent Mines, which it has operated under leaseholds for many years.

One of the chief reasons for Harvester's withdrawal from iron mining operations has been the long strike which has tied up the Wisconsin Steel Ore Mines since Feb. 8, 1946. The protracted strike by the United Steel Workers (CIO) was not the only factor in the company's decision to withdraw from mining operations. The leases held by Harvester on the Mesabi ore properties expire in a relatively short time. Furthermore, it was said, their enlarged manufacturing operations require more ore in the future, which has made it necessary for them to seek other long range sources of supply.

The company has stated that it will now buy its iron ore requirements in the open market and that the transfer of the property to Cleveland-Cliffs will not mean a loss of employment either to employees or ore range communities.

Geneva Steel Co. Buys a Town

Washington

• • • **Giving an answer to housing needs for employees, the Geneva Steel Co., has purchased an entire town from WAA. The purchase included everything in the town from lawnmowers to the fire department, hospital, postoffice, water facilities, church, school, and so on.**

One of 55 bidders, Geneva's offer of $1,553,000 cash gave it ownership of Dragerton, Utah. The town has a population of 2500. Under the terms of the bid, Geneva proposes to lease houses in the town to its employees at reasonable rentals and from time to time, offer the houses for sale at fair prices.

There is a shortage of miners at the Geneva mine because of a lack of housing and acquisition of Dragerton makes possible acquiring of accommodations which the steel company proposes to make available to its own employees to meet coal demands of the Geneva plant.

The town is unincorporated and WAA said it is complete with everything a city needs "except accessibility." The self-sufficient settlement is in Carbon County, Utah, 23 miles east of the city of Price, hard by Desolation Canyon.

It was developed by the government in 1943 at a cost of more than $4,530,000 to provide accommodations for families of coal miners at Geneva coal mines. The town covers 377 acres, has 605 modern dwellings of four, five and six rooms.

The school house cost the government $276,164. Geneva is going to sell it to the town authorities for $1.00. The town church which cost the government $18,162 also will be sold to town authorities for $1.00. The hospital and clinic which cost $103,019 will be operated and disposed of in a manner to guarantee low cost medical and health service to the entire community.

Weekly Gallup Polls . . .

School Teachers Have Widespread Public Sympathy

Princeton, N. J.

• • • **The school teachers** of the nation, many of whom are fighting at this time for increased income, have the sympathy of the vast majority of the U. S. citizens, according to George Gallup, director, American Institute of Public Opinion.

School teachers have done an impressive job during the past 6 months in winning peoples sympathy to their cause. Six months ago 44 pct of the people in a nationwide poll thought that teachers' salaries were too low. Today the figure stands at 64 pct—a very sharp increase of 50 pct among those who regard teachers' salaries as inadequate.

Moreover, among these people, more than three out of four say they are willing to pay more taxes so that school teachers can be given more pay.

The survey includes questioning of voters in all walks of life, in communities large and small across the nation. The questions:

(1) "Do you think that school teachers' pay in your community is too high, too low, or about right?"

The replies to question one are contrasted to those in the September survey on the same question.

	Today Pct	Sept., 1946 Pct
Too high	2	2
Too low	64	44
About right	22	33
No opinion	12	21

The second question in the survey is limited to those people who said they think school teachers' pay is too low at the present time.

Tax authorities cannot take replies to the second question as a "go-ahead" to levy a series of special taxes in order to finance salary boosts for teachers.

While a majority of voters who think teachers' salaries are low now say they would be willing to pay an additional tax in order to raise teachers' salaries, many people may not feel that a special tax is necessary. They may for example feel that economies in other departments will be able to finance the increased cost of higher salaries for teachers.

Moreover, replies to the questions do not constitute approval for any specific proposal.

(2) "Would you be willing to pay higher taxes in order to raise teachers' salaries?"

	Pct
Yes	51
No	11
No opinion	2
Total who think teachers' pay is too low	64

The willingness to pay more taxes to increase the salaries is found in greater proportion among the people with some college training. This is shown in the table below:

	College Pct	High School Pct	Grammar School or Less Pct
Yes	76	57	41
No	7	10	13
No opinion	—	2	3
Total who think pay is too low	83	69	57

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This means that the Democratic Party has regained in Presidential party support six percentage points from its post-Roosevelt low right after the November elections.

A lot will of course depend on the candidates, both the Republican and the Democratic.

These facts are based on a question dealing with party preferences in a Presidential election today—aside from who the candidates may be.

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"If a presidential election were being held today, which party would you vote for—the Democrat or the Republican?"

Major Party Vote

	Dem. Pct	Rep. Pct
1944 election	54	46
Aug. 1945	58	42
Feb. 1946	55	45
May	52½	47½
July	49	51
Sept.	50	50
Oct.	47	53
Nov. (Post-election)	45	55
Dec.	47	53
Jan. 1947	50	50
TODAY	51	49

Certainly one of the contributing factors (but not necessarily the primary one) in the Democratic recovery as shown above is the rising popularity of President Truman, who was found at an all-time low in popularity before the November elections.

From a low in October of 32 pct approving the way Mr. Truman was handling his job the President's rating soared 16 percentage points—to 48 pct.

Whether the movement toward the Democratic Party will con-

(CONTINUED ON PAGE 158)

House Committee Okays 4¢ Per Lb Import Tax Suspension on Copper

Washington

• • • **A rewritten** bill which would suspend until Mar. 31, 1950 the 4¢ per lb import excise tax on copper has been approved by the House Ways and Means Committee.

Previous measures seeking to reduce or repeal the tax outright were discarded. Another feature of the revised version also provides that for the same period the tax shall not apply to copper withdrawn from warehouses after the enactment of the bill.

Backers of the measure will press for swift action in view of the present shortages of this metal, it was said. Government sources estimate the 1947 copper supply at around 1 million tons; while this represents an increase of more than 100,000 tons over 1946, it will fall below 1947 requirements.

Barring work stoppages, such as those in 1946 which are estimated to have cost nearly 200,000 tons of production, it is expected that there will be about 965,000 tons of domestic refined copper of which about 45,000 tons is secondary copper passing through primary refineries.

In addition, it is expected that there will be available during the first quarter 1947 some 30,000 tons purchased abroad for which commitments were made prior to termination of the public purchase program in November.

In comparison with the 700,000 tons released from government stocks last year, there is now in sight only about 125,000 tons which the OMR could perhaps make available this year.

Suspension of the import excise tax is expected to increase supplies since most fabricators are unwilling to pay the extra 4 ct on top of the prevailing price which has been running around 22 ct per lb.

Need for increased supplies from foreign sources is also seen in the fact that while the manpower situation has improved, it has not kept pace with postwar demands for copper; wage increases have not attracted the additional workers needed in the mines.

Allegheny Ludlum Ups Stainless Steel Output

Pittsburgh

• • • **Although combined** production of all products was lower than during war years, due to lost production during last year's industrywide steel strike, stainless steel production totaling more 140,000,000 lb was the highest in Allegheny Ludlum Steel Corp.'s history, according to H. G. Batcheller, president.

Net earnings in 1946 were $6,599,346, equivalent to $5.12 per share of stock. Net sales and revenues amounted to $95,277,573 for the year, compared with sales and revenues of $100,401,059 for 1945.

Cleveland-Cliffs Buys Harvester Ore Mines On the Mesabi Range

Chicago

• • • **The Wisconsin Steel Ore Mines,** on the Mesabi range near Hibbing, Minn., a division of the International Harvester Co., was sold to Cleveland-Cliffs Iron Co. on Mar. 1. The company will sublease to Cleveland-Cliffs the Agnew, Hawkins and Sargent Mines, which it has operated under leaseholds for many years.

One of the chief reasons for Harvester's withdrawal from iron mining operations has been the long strike which has tied up the Wisconsin Steel Ore Mines since Feb. 8, 1946. The protracted strike by the United Steel Workers (CIO) was not the only factor in the company's decision to withdraw from mining operations. The leases held by Harvester on the Mesabi ore properties expire in a relatively short time. Furthermore, it was said, their enlarged manufacturing operations require more ore in the future, which has made it necessary for them to seek other long range sources of supply.

The company has stated that it will now buy its iron ore requirements in the open market and that the transfer of the property to Cleveland-Cliffs will not mean a loss of employment either to employees or ore range communities.

Geneva Steel Co. Buys a Town

Washington

• • • **Giving an answer to housing needs for employees, the Geneva Steel Co., has purchased an entire town from WAA. The purchase included everything in the town from lawnmowers to the fire department, hospital, postoffice, water facilities, church, school, and so on.**

One of 55 bidders, Geneva's offer of $1,553,000 cash gave it ownership of Dragerton, Utah. The town has a population of 2500. Under the terms of the bid, Geneva proposes to lease houses in the town to its employees at reasonable rentals and from time to time, offer the houses for sale at fair prices.

There is a shortage of miners at the Geneva mine because of a lack of housing and acquisition of Dragerton makes possible acquiring of accommodations which the steel company proposes to make available to its own employees to meet coal demands of the Geneva plant.

The town is unincorporated and WAA said it is complete with everything a city needs "except accessibility." The self-sufficient settlement is in Carbon County, Utah, 23 miles east of the city of Price, hard by Desolation Canyon.

It was developed by the government in 1943 at a cost of more than $4,530,000 to provide accommodations for families of coal miners at Geneva coal mines. The town covers 377 acres, has 605 modern dwellings of four, five and six rooms.

The school house cost the government $276,164. Geneva is going to sell it to the town authorities for $1.00. The town church which cost the government $18,162 also will be sold to town authorities for $1.00. The hospital and clinic which cost $103,019 will be operated and disposed of in a manner to guarantee low cost medical and health service to the entire community.

Weekly Gallup Polls . . .

School Teachers Have Widespread Public Sympathy

Princeton, N. J.

• • • **The school teachers** of the nation, many of whom are fighting at this time for increased income, have the sympathy of the vast majority of the U. S. citizens, according to George Gallup, director, American Institute of Public Opinion.

School teachers have done an impressive job during the past 6 months in winning peoples sympathy to their cause. Six months ago 44 pct of the people in a nationwide poll thought that teachers' salaries were too low. Today the figure stands at 64 pct—a very sharp increase of 50 pct among those who regard teachers' salaries as inadequate.

Moreover, among these people, more than three out of four say they are willing to pay more taxes so that school teachers can be given more pay.

The survey includes questioning of voters in all walks of life, in communities large and small across the nation. The questions:

(1) "Do you think that school teachers' pay in your community is too high, too low, or about right?"

The replies to question one are contrasted to those in the September survey on the same question.

	Today Pct	Sept., 1946 Pct
Too high	2	2
Too low	64	44
About right	22	33
No opinion	12	21

The second question in the survey is limited to those people who said they think school teachers' pay is too low at the present time.

Tax authorities cannot take replies to the second question as a "go-ahead" to levy a series of special taxes in order to finance salary boosts for teachers.

While a majority of voters who think teachers' salaries are low now say they would be willing to pay an additional tax in order to raise teachers' salaries, many people may not feel that a special tax is necessary. They may for example feel that economies in other departments will be able to finance the increased cost of higher salaries for teachers.

Moreover, replies to the questions do not constitute approval for any specific proposal.

(2) "Would you be willing to pay higher taxes in order to raise teachers' salaries?"

	Pct
Yes	51
No	11
No opinion	2
Total who think teachers' pay is too low	64

The willingness to pay more taxes to increase the salaries is found in greater proportion among the people with some college training. This is shown in the table below:

	College Pct	High School Pct	Grammar School or Less Pct
Yes	76	57	41
No	7	10	13
No opinion	—	2	3
Total who think pay is too low	83	69	57

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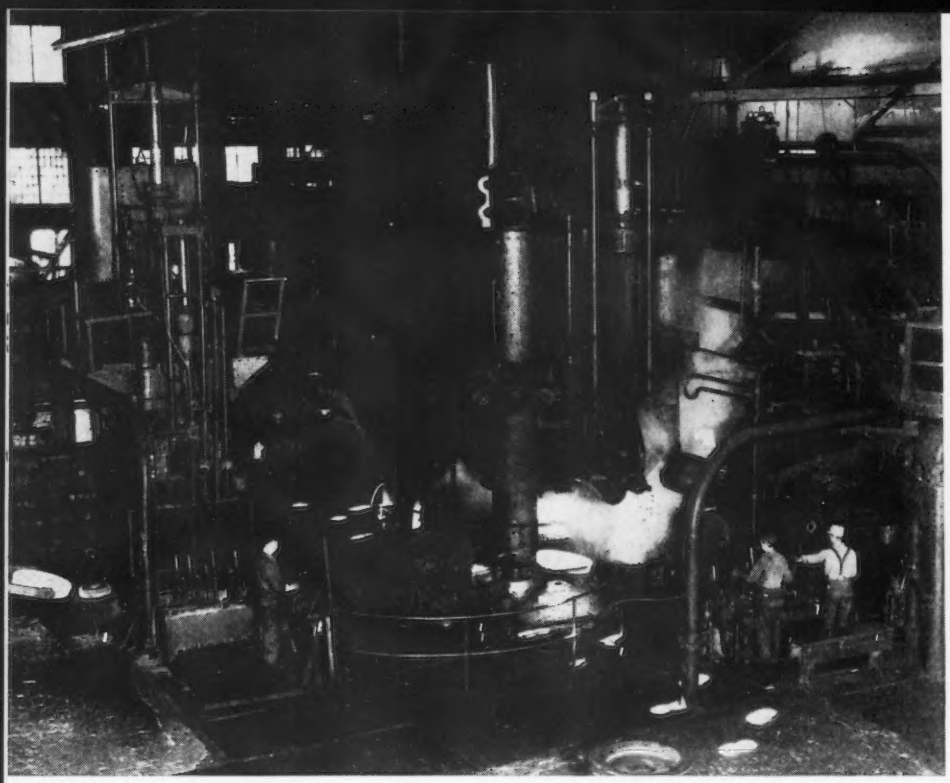
(CONTINUED ON PAGE 158)



WHERE WHEELS ARE HOT: *The wheel mill at the Carnegie-Illinois Gary plant is busily engaged in trying to meet pressing demand for more wrought steel wheels. After forging the blanks from round bloom blocks, the wheels are reheated, rolled, coned, heat treated and machined.*

Say Severest Freight Car S
Hit Nation in Su

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By D. I. BROWN
Chicago Regional Editor

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Chicago

• • • **The initial,** all important battle of car shortages, was fought and lost in January 1942 when the War Production Board reduced to a fraction the number of cars the railroads had planned to build. The effects are now being felt and according to A. H. Schwietert, former chairman of the Midwest Shippers Advisory Board, and present traffic director of the Chicago Assn. of Commerce and Industry, next July and August will bring the most severe shortage yet experienced unless, business drops considerably, the 1947 harvest is poor, or shippers and railroads somehow evolve much more efficient utilization of existing equipment.

Observers here declare that the skirmish in Washington was more of "bulge" nature than anything else. Of all the possible bottlenecks which can prevent the ultimate realization of the 10,000 car per month building program, wheels appear to be the item most likely to emerge as the limiting factor. W. C. Kendall in his Feb. 20 car service report to the American Assn. of Railroads, demonstrated that the shortage in cars continues to be most prevalent in the box type.

Many opinions have been advanced concerning the factors that contributed to the present shortage. The western railroads claim that the WPB action in 1942 was the crowning assault and the material shortages experienced since then are of minor consequences. They back up their contentions with some convincing data.

In anticipation of more business, the railroads in 1941 ordered 106,897 cars. WPB in January 1942 decided that ships, guns and bullets were more important and refused to allocate the necessary steel and iron for the program. The result of this action was that only 28,560 cars were ordered by the roads that year. On the promise that the materials for 106,000 cars had been furnished for that year, and each of the three succeeding years to meet such a program, the railroads would have installed approximately 424,000 cars by the end of 1946.

The average yearly retirement of all cars for demolition and sale only, from 1934 to 1941 averaged 46,642 per year. Assuming that retirement during the war years averaged the same as previous years, the net gain in the number of usable cars at the end of 1946 would have been 241,432. This is almost five times what Mr. Hayden, chief of the car service division, AAR Chicago, estimated to THE IRON AGE recently as the absolute minimum number of additional cars needed to satisfactorily meet the present carloading demand.

The above being pure assumption it is of interest to note what actually happened. From January 1942 to December 31, 1946, 223,328 freight cars were built. For the same period 105,978 cars were retired for demolition and sale only. This retirement does not include work cars, nor those retired for rebuilding or lease to others. It is apparent then, that for the period mentioned the car pool increased by 117,350 cars. This figure subtracted from the one reached by synthesis then is near the number of cars lost by WPB action in 1942.

The total deficit is 124,082 cars, which based on other authoritative estimates, is just about the number needed to avert the present shortage. Further, the number coincides with the total yearly program recently decided on in Washington. The railroads during the war and immediate postwar period did not retire cars at anywhere near the peacetime rate, so that the actual deficit in cars at the moment on the above basis is even greater than the figures indicate.

It has been asserted that under the duress of war demands for steel the WPB decision may have been the only rational choice. Nevertheless, the railroads claim that this action was by far the largest contributing factor to the present lack of cars. The high peacetime loading which occurred in 1945 and 1946 could not be anticipated, but if the railroad

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Car Shortage Will in Summer

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Predicts Chief Bottleneck In Car Construction Will Be Steel Wheel Supply

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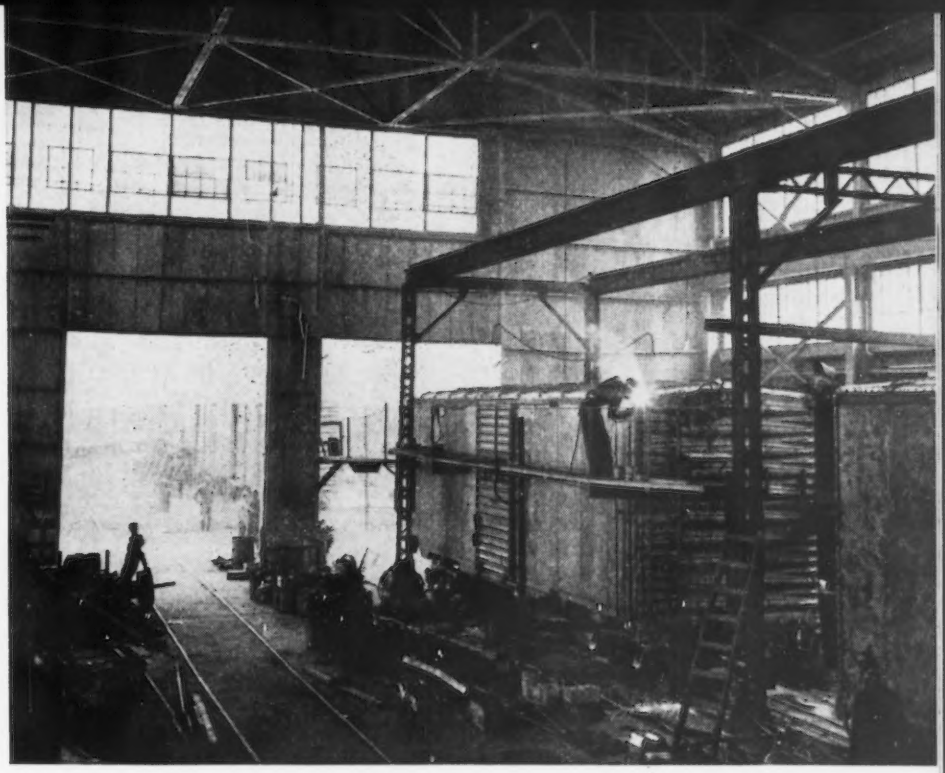


END OF THE LINE: *Finishing touches are being applied to a box car about to roll off the end of the production line at one of Pullman Standard Car Mfg. Co.'s plants. Notice finished cars in the yard and the assembly line at the left not in operation.*

industry had been permitted to carry out the above program even the present huge demand could have been met.

Another feature of present demand compared to wartime needs is that the consistent long hauls in two or three main directions during the war enabled the railroads to utilize their plant at highest efficiency. Present demands are for shorter hauls, in all directions, with lighter loading and l.c.l. demand much higher. The 5-day week has greatly lengthened turnaround time and all these factors have served to aggravate the general car shortage.

According to Mr. Kendall's Feb. 20 report to the AAR, the serviceable ownership of box cars showed a decrease of 11,081 units in Jan. 15, 1947, compared to Nov. 1, 1946. Carloadings of grain and grain products which demand class A box cars were 2.9 pct greater during the first 6 months of 1946 than in 1945. Total box car loadings during the first 5 weeks of this year averaged 360,-751 per week, or an increase of 2.6 pct and only 9.9 pct under the peak of 1946, when an average of 400,499 loadings was experienced during the week ending Nov 2, 1946.

Revenue coal loadings so far this year are about 7 pct above 1946 and 14 pct in excess of 1945. In addition tons per car have been increased about 1 pct. Right on down the line, carloadings and car shortages appear to be increasing. Average turnaround time in 1947 was a little better than December 1946. More freight embargoes have been slapped on shippers so far this year than all the embargoes enforced last year. Serviceable cars increased but 394 during January of 1947 despite the installation of 2795 new cars. These data secured from Mr. Kendall's report substantiate Mr. Schwietert's prediction that the worst is yet to come.

That the railroads delayed in placing orders immediately after the war, is past history. Many shippers claim the prime reason that such orders were delayed evolved about, and was part of the strategy employed in the roads' efforts to get higher freight rates. The railroads declare that under the circumstances of 1946 operating losses they couldn't possibly order much new equipment.

Furthermore, they claim there was no use in ordering cars, the material for which the car builders could not obtain. The latter contention does not hold much w a t e r, independent observers claim.

As to the former, while it is said that the companies issuing equipment trust certificates were willing to finance any car building program instituted by the major roads during that period, railroad spokesmen point out that this would have increased their interest charges in a period of red ink operation.

The car builders accepted and are still delivering export cars placed by foreign countries during the same period, so materials were available. No matter how the export car program is defended, many observers point out that a sheet or plate or iron for wheels could have gone proportionately as far on a domestic car as on an export car.

Car builders claim they couldn't be expected to shut down part of their plants because domestic railroads refused to enter orders and that the export program enabled them to retain their skilled labor and keep them out of the red. Railroads counter such statements by recalling that the car builders are behind in deliveries and were not at any time current in their production.

The need for steel by all industry has created a vicious cycle. The steel now to be allocated to car builders has to be taken from the mill quotas formerly planned for other industries. Users of steel other than the railroads are saying that if and when the 10,000 car builders program takes hold, they will be so short of steel for their production that their need for freight cars will substantially drop and that the railroads are cutting their own throats. The railroads standard reply to this

is that there is not much use trying to build any product if the freight cars necessary to deliver the raw material and then ship the finished goods aren't available.

Regardless of who is right and why, independent observers caution that the present 10,000-car program cannot be attained under current circumstances and that an alleged happy medium will naturally result. It is conceded that the steel industry can and will supply the sheets, plates, bars, etc. needed. Car builders report they have capacity to build 14,000 cars a month and that the 10,000 program is possible if the steel industry delivers and unexpected labor shortages do not occur.

In Washington the plan was first laid out under the assumption that the available steel wheel supply could not take care of the requirements for the 10,000 cars, but that if necessary the car builders could rely on the cast iron foundries to make up the difference. (See THE IRON AGE, Feb. 13, p. 162.) Herein lies the difficulty, say the pessimistic prophets.

The Assn. of Chilled Car Wheel Manufacturers in answer to an inquiry from THE IRON AGE stated that their capacity permitted 3,360,000 car wheels per year. The production figures for 1946 show that operations were only about 55 pct of capacity. Of the freight car wheels made in 1946, approximately 94 pct were for replacement of existing wheels on cars in service so that it appears that the available cast wheel supply for new cars is quite small and not sufficient to cushion the steel wheel shortage. The association further reported that operations could not be increased to any appreciable extent in 1947 because of cast scrap and pig iron shortages and that they expect a 10 pct increase in maintenance demand this year.

1946 Cast Iron Chilled Wheel Production for Freght Cars

1,832,069 total wheels—domestic
1,708,462 wheels — maintenance
123,605 wheels—new cars
130,182 wheels—export

At 10,000 cars per month the wheel requirements in a year amount to 960,000 wheels. If the iron foundries can operate at last year's rate and divert all export wheels to domestic needs, they are only capable of supplying about 253,787 wheels. The difference in wheel weights was not calculated but this figure roughly approximates their ability to deliver wheels for new car construction only. This leaves a balance of 706,213 wheels needed in a year's time which would have to come from the steel industry.

Wrought steel wheel production figures are difficult to secure. In 1946 the industry reported that they made 110,891 wrought steel freight wheels up to and including October. Another estimate for the year from reliable sources was that for the entire year they delivered 111,411 steel freight car wheels for new construction. The American Iron & Steel Institute reported the annual production of rolled steel wheels in 1946 was 252,656. If all the wrought steel production, based on 1946 actual, were diverted to freight car wheels, the above deficit would be reduced to about 453,557 wheels.

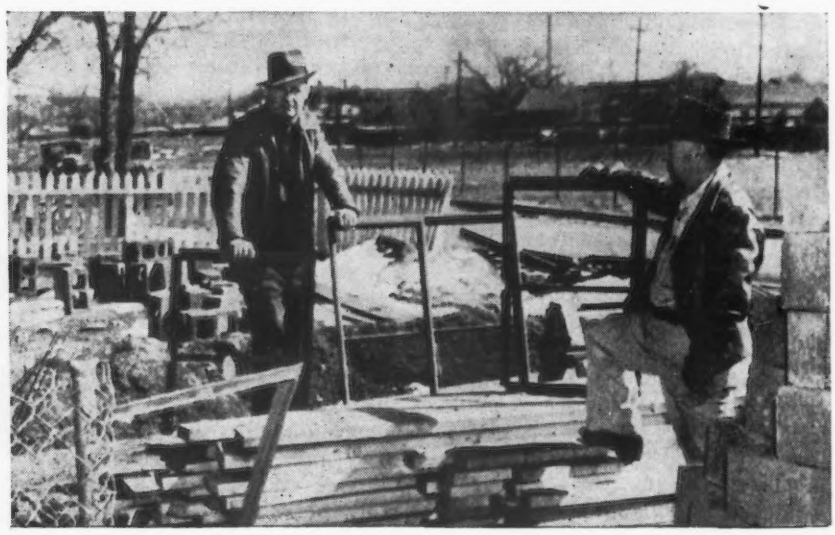
Here again different weights of passenger wheels, locomotive wheels and sizes or weights of freight car wheels have not been calculated. AISI reports the annual rolled steel wheel capacity in tons only. This figure was given THE IRON AGE as 315,400 tons per year. Based on the 560 lb weight for an A33 wrought wheel, the steel industry could produce around 1 million freight car wheels if the rolling mills could handle that much tonnage. No industry figures are available on the exact rolled steel freight car wheel capacity, but one large producer told THE IRON AGE 500,000 was a close estimate.

From the above it is apparent that only by government allocation of more cast scrap and pig iron to the foundries, and by the mills diverting more ingot tons to their wheel plants, can the eventual 10,000-car program become an actuality.

The demand cycle is even more vicious in this industry than in steel, as government directives of iron to housing programs has already greatly disturbed the situation and the railroad brake shoe program has been tough to meet in itself. With the controls about to go off on iron for the housing program, officials in Washington may find it necessary to reapply controls and channel supplies to the wheel makers. If neither industry can produce more wheels than last year, 1947 domestic freight car production will total about 50,000 cars, only 9000 over the amount built last year.

At this rate, the car shortage is here to stay until, if or and, national carloadings decrease by at least 20 pct, turnaround time is considerably reduced, all bad order cars are quickly returned to service, or the other carriers take up the slack.

EVERYTHING BUT A PERMIT: *The Civilian Production Administration has twice refused James Henry (left) and John Dunn (right) permission to build a Denver store with living accommodations in back, according to the International-News caption accompanying this picture. The gimmick is that the two entrepreneurs have on hand everything they need for their building but can't get permission to build because of a "shortage of building materials."*



WAA Announces Sale Of Ringwood N. J. Iron Mines to H. P. Moran

Washington

• • • **Sale of the historic Ringwood iron mines, Ringwood, N. J., to H. P. Moran, New York, for $1,297,000 has been announced by WAA.** The 31 structures and the 878 acres of land which comprise the site of the Ringwood mines was acquired by the government in 1942 and has a reported cost, including improvements made since that time, of $3,923,082. The mines have not been in operation since 1926 with the exception of small quantities of ore brought to the surface for test purposes. Government acquisition of this property was a wartime security measure.

Iron ore was discovered in this area during the Revolutionary War days and, according to early American history, iron from these mines was forged into the chain which spanned the Hudson River and prevented British ships from reaching the strategic positions upstream.

Although the new owner estimates that, for a minimum of 10 years, more than 300,000 tons of ore per year can be mined from the shafts, he pointed out that before the installation can be placed in operation, the shafts must be deepened and new equipment shipped to the site. He said also that housing for labor must be rehabilitated and miners must be imported from other sections, since there are few available in that section of the country.

National Metal Products Co., Pittsburgh, has leased Building No. 65 at the $8 million government-owned aluminum forgings plant in Canonsburgh, Pa., from WAA.

Under WAA's "multiple tenancy" program which provides for dividing the government's larger war-plants into units for occupancy by more than one concern, the National Metal Products Co. leased 25,275 sq ft of floor space for use in the production of aluminum window sash for veterans' housing. The company will rent the space for 5 years at $9099 annually, or 36¢ per sq ft per year. Employment will be provided for an estimated 150 persons, mostly veterans.

During the war, the huge plant was operated by the Aluminum Co. of America for the production of aluminum forgings.

A $10 million inventory of surplus, government-owned general purpose welding equipment and supplies is being offered for sale by WAA at fixed prices. Arc welding equipment, consumable electrodes, welding rod and wire, and resistance welding equipment are offered at prices ranging from 25 pct to 75 pct of acquisition costs, depending upon conditions, WAA said.

The supplies are located principally in the Boston, Chicago, Detroit, New York, Philadelphia, Richmond, Va., and Spokane, Wash., regions.

Some special resistance welding units will be offered on competitive bid basis. All these commodities are offered to priority claimants and to commercial buyers concurrently, with a reserve established for priority claimants.

WAA is offering for sale or lease the $4.4 million aluminum castings foundry in Cleveland, Ohio, which was operated by the National Aluminum Cylinder Head Co. for the government during the war. Wartime production amounted to 600 tons of castings monthly.

This offering represents the last complete aluminum sand castings foundry owned by the Federal Government. Proposals will be received at P.O. Box 6432, Cleveland, until 4 p.m., Apr. 7.

The government's $2½ million magnesium foundry in Chicago, formerly operated by the Howard Foundry Co., has been placed on the block. Bids for its purchase or lease will be received by WAA, Box 1085, Chicago, until Apr. 15. It is equipped to produce 350,000 lb of large magnesium sand castings per month.

Rheem's Net Income Down

New York

• • • **Rheem Manufacturing Co.** reports 1946 net earnings of $1,198,948 compared with 1945 net earnings of $1,498,414. This is equal to $1.06 per share of common compared with $1.82 per share in 1945.

Net sales for 1946 were $39,268,335, of which $22,539,245 represented household appliances and $16,729,090 steel shipping containers. Though far below the 1945 wartime peak of $91,309,854, the 1946 sales were almost four times the $10,351,013 of pre-war sales reported for 1940, according to R. S. Rheem, president.

BUT NOT A LUMP TO BURN: *With Britain in the throes of the worst coal shortage in her history this was the scene in the Toton, England, rail yards after the unprecedented snows early in February tied up a rail transportation system never intended to cope with such heavy weather.*

All Priority Ratings To Be Dropped Except For Vets Housing Program

Washington

• • • **CPA has decided** to toss overboard all priority ratings after Mar. 31 except for very limited use in support of the Veterans' Emergency Housing Program and in aiding the Veterans Administration Construction Program, mostly for hospitals. Beginning Apr. 1, rating assistance will be given, in general, only in support of the housing program and to aid the Veterans Administration building program. Ratings already issued for other reasons will expire.

The action was accomplished by issuance of PR-35, which contains a new rating symbol "RR," and by changes in PR 1, 3 and 28. CPA also published a table of building products (table I to PR 28) and a supplement to PR 28 which states the conditions under which RR ratings may be granted from now on. This list includes such products as:

Bathtubs; low pressure boilers, for residential heating; butts, hinges and hasps; door locks and lock trim; sash, screen and shelf hardware; night latches and deadlocks; spring hinges; sash balances and sash pulleys; cast iron soil pipe and fittings; cast iron pressure pipe; certain kinds of electric service equipment and branch circuit overload protective devices; furnace pipe-fittings and duct work; warm air furnaces; insect screen cloth; registers and grilles for heating systems; metal windows and frames; and electrical wiring devices of certain kinds.

Provision is made, however, for the continuance of valid ratings now outstanding when they are to be used to obtain construction items listed on Schedule A to PR 33. The new regulation also provides that a producer of a critical building product may convert his old AAA, MM, or CC rating to the new RR rating by Mar. 31 for the purpose of getting any item needed to maintain or increase his production of a building material or product listed on table I to PR 28.

Valid HH and HHH ratings are not affected in any way by PR 35. Valid AAA, MM and CC ratings issued for the purchase of any building material or product listed on Schedule A to PR 33 are not revoked and remain in effect in accordance with the rules under which they were issued, except that they may not be used and will not be effective for the purchase of steel for delivery after Mar. 31.

At the end of March, all AAA, MM and CC ratings for any material or product, other than a construction item, will expire.

Under certain conditions, the existing Form CPA-541A may be used by applicants for new RR ratings to replace CC ratings by marking the form "Rerating Request PR 35," stating the previous case number and date of issuance of the rating certificate. A request for a rerating of an MM or AA preference rating may be made to CPA by letter or telegram, marked "Ref. PR 35," and identifying the previous case. In either instance, it must be explained fully why a rerating is necessary in support of the housing program or the Veterans' Administration Construction Program.

Any rated order which is rerated RR or RRR before Apr. 1 must be treated by the person with whom the order was placed as if it had carried the new rating at the time the original rated order was received by him.

During the transition period until Mar. 31, CPA may continue to issue CC ratings under the conditions stated in PR 28. AAA ratings may continue to be assigned until that time under existing procedures. Beginning Apr. 1, no AAA, MM or CC ratings will be issued for any purpose.

PR 35 applies to preference ratings only and does not affect any other priorities or allocation instruments, the regulation explains.

Coming Events

Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.
Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.
Mar. 17-19 American Gas Assn., sales conference, Boston.
Mar. 17-19 Chicago Technical Societies Council, production conference, Chicago.
Mar. 19-22 American Society of Tool Engineers, annual meeting, Houston.
Mar. 19-22 National Screw Machine Products Assn., annual meeting, Cleveland
Mar. 22-27 Western Metal Conference and Exposition, American Society for Metals, Oakland, Calif.
Mar 24-25 American Machine Tool Distributors' Assn., spring meeting, Chicago.
Mar. 31-Apr. 2. Midwest Power Conference, Chicago.
Apr. 7 Packaging Machinery Manufacturers Institute, semiannual meeting, Philadelphia.
Apr. 7-10 National Assn. of Corrosion Engineers, convention, Chicago.
Apr. 8-11 American Management Assn., packaging exposition, Philadelphia.
Apr. 14-16 National Machine Tool Builders' Assn., spring meeting, Atlantic City, N. J.
Apr. 14-17 Electrochemical Society, Inc., Columbus, Ohio.
Apr. 14-17 Southern Machinery & Metals Exposition, Atlanta.
Apr. 28-29 American Zinc Institute, annual meeting, St. Louis.
Apr. 28-May 1 American Foundrymen's Assn., convention, Detroit.
Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America. Chicago.
May 5-6 National Welding Supply Assn., convention, Philadelphia.
May 6-10 Society of the Plastics Industry, Inc., exposition, Chicago.
May 15-17 Society for Experimental Stress Analysis, annual meeting, Chicago.
May 26-27 American Iron & Steel Engineers, annual spring conference, Philadelphia.
May 27 Metal Powder Assn., spring meeting, New York.
June 9-11 American Coke & Chemical Institute, annual meeting, French Lick, Ind.
June 16-20 American Society for Testing Materials, annual meeting, Atlantic City, N. J.
June 17-19 Machinery Dealers National Assn., convention, Cincinnati.
June 23-27 American Electro Platers Society, industrial finishing show, Detroit.

The London ECONOMIST

England Faces Further Crises

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

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ENGLAND now stands in relation to a raw material shortage as that in which it stood towards the threat of a fuel crisis last summer. There is still time to act; but not much. The most painful and unpopular measures need to be set in motion to avoid the crisis arising; but at the same time plans need to be laid on the assumption that the worst will happen.

It is, heaven knows, hard enough to find remedies, likely to be immediately effective, for the difficulties in which the British economy finds itself. What is depressing in the extreme is the circumstantial report that the government is giving up the attempt to find any remedies at all and that the much-postponed "Economic Budget" will consist almost wholly of diagnosis and hardly at all of prescription. The Cabinet, it appears, is so hopeless divided on every specific policy that is put forward that the only way it can find to agree is to have no general policy at all.

Admittedly it is difficult for a Labor administration to adopt a policy for just this situation, since so many of the things that are plainly necessary run counter to the Labor Movement's most cherished delusions—in particular to that cardinal principle of trade unionism that it is always right to press for more pay and less work.

But a realist policy is by no means impossible to contrive. The four cardinal heads of it were set out as: The recruitment of additional workers; the revision of taxation to increase the incentives to effort and enterprise; the creation of a wages policy designed to the same end; and a discriminating overhaul of the apparatus of control. There are other chapter headings that could doubtless be added.

What is most important at the moment is to emphasize that there can be no such thing as a policy that is both effective and painless.

In particular, three unpleasant resolutions will have to be taken. The first is that the interests of the country will have to come before those of the trade unions. (And of the trade associations too, but there is less danger of that being forgotten.)

It is nonsense to be talking about a 40-hr week in present circumstances. It is folly to interpose any obstacles to the recruitment of labor. It is wicked to limit the fullest possible use of the country's mechanical plant, by double-shift working or otherwise. A Labor Government doubtless finds it hard to say these things; but it is the only kind of government that can say them and command a hearing. That it must do or forfeit its right to lead the nation.

THE second painful acknowledgment that must be made is that there is an inevitable conflict between equity and efficiency, between social justice and social productivity, and that efficiency cannot without peril always be pushed to the wall. A nation that plans its economic affairs with the sole object of fair shares for all will be an impoverished economy.

To say this is not to urge a return to the rule of the rich. But it is to say that if unfair privileges for the miners will produce more coal, they must be granted, and that if the demobilization out of turn of certain categories of skilled workers will speed up productivity, it must be done at once, and that if the granting of greater monetary rewards will bring about more enterprise at the cost of less equality, the bargain is well worthwhile.

The third unpopular confession that must be made is that the planned economy has bitten off more than it can chew and must disgorge something if it is not to choke. There is not enough ministerial wisdom or administrative capacity to go round, and to save the controls that are vital some of the others must be abandoned.

The overriding priorities are to improve the balance of payments, to produce fuel and—on a lower plane—to build houses. Every control should be searchingly examined to see whether it contributes directly to one of these objects. If the verdict is that its abandonment would not materially damage any one of the three, then it should be remembered that unnecessary controls use up scarce resources of administrative skill and frustrate the springs of enterprise.

If these rests were drastically applied, it might well be found that there would be a net gain to the country from an abandonment of the attempt to control the level of prices.

LET nobody shrink from these confessions for fear of being dubbed a reactionary. There is no need to abandon hope for an advance towards industrial democracy, towards social justice and towards the assertion by the community of purposive control over its economic environment. But the advance towards these goals has been pressed forward so recklessly that it is now in danger of being cut off. The pressing need of the moment is for a tactical withdrawal for the regrouping of economic resources.

And what of the political context within which any policy of realism and reinvigoration will have to be pursued? That it requires the cooperation of every section of the nation, both in working out the policy and in executing it, is perfectly obvious.

Many people have, therefore, been led to the conclusion that it requires a coalition of the Labor and Conservative parties. In our

(CONTINUED ON PAGE 160)

Asserts U. S. Spent $43 Billion in Subsidies From 1934 to 1946

Washington

• • • During the 1934-1946 period the Federal Government paid out $43 billion in all types of subsidies. Authority for this statement is the Joint Committee on Reduction of Nonessential Expenditures. Economy-minded Sen. Harry F. Byrd, D., Va., is head of the Committee. Federal subsidies to business and agriculture in the years from 1934 to 1946 totaled $13 billion.

Just as he has continuously urged a topping off of expenditures and of government personnel, he wants these subsidies and grants in aid to states eliminated, if possible, or at least reduced. He urged a thorough report of all subsidies, especially with regard to their effect upon basic maladjustments. He submitted a report that has been printed as a Senate document. It consists of 287 pages.

It includes a complete listing of all subsidies to business and agriculture for the years 1934-46, except for those that did not exist as far back as the earlier years. One class of subsidies that did not go that far back were those applying to copper, lead and zinc. Subsidies on these metals began on Jan. 12, 1942. Subsidies paid on them during the 1942-46 period aggregated $283,656,000, according to the report.

Senator Byrd said the report showed that the states are now able

Senator Byrd Urges Subsidies That Now Aids States Be Dropped or Reduced

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to carry a greater proportion of the expenditures for their own functions which heretofore have been shared with or exclusively from the Federal Government.

The Virginia Senator suggested that the Appropriations Committees of the House and the Senate could profitably spend the time in the current deliberations on appropriations bills necessary to develop fundamental information with respect to Federal subsidy policies with a view to doing away with Federal subsidies or reduce those considered to be nonessential. If this could not be done in some cases without additional legislation, Senator Byrd said he hoped that the committees would recommend the necessary legislation through proper channels.

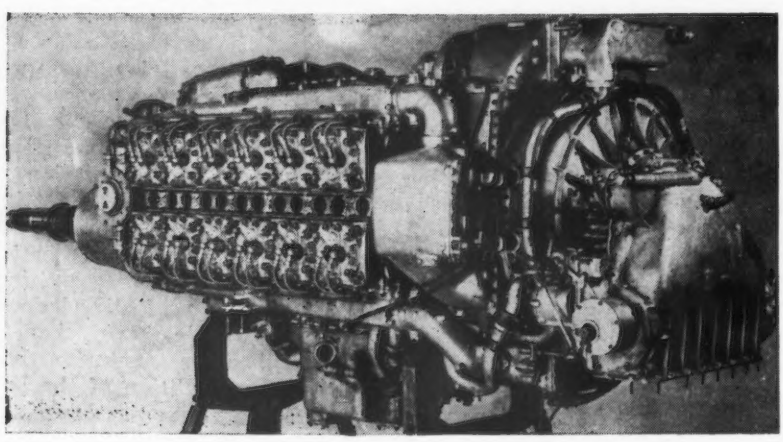
"Such a course by the Appropriations Committees," the Senator said, "would afford a means of a practicable and immediate beginning in the problem and the information they develop would be a good beginning for a more complete study which I hope will be started immediately."

Meanwhile, Senator Lodge, R., Mass., has introduced a companion bill to one introduced in the House by Representative Brown, R., Ohio, which calls for a study by experts and members of Congress of the reorganization of the executive branch and to report back to Congress in January 1949, just at the time when the 81st Congress will be beginning. It is proposed to set up a 12-man commission which would have a full year and a half to go through the government "with a fine toothed-comb and to throw light into all of the musty old corners," Senator Lodge said. The intention is to make economies in the executive branch, not to make cuts in personnel and services that are needed but to retain the essential work and establish the government on a sound management basis.

"It is no exaggeration to say that it (the government) is organized in a way that makes efficient, farsighted action difficult, if not impossible," said the Senator. "If an Army or a Navy or a business enterprise or a newspaper office were organized the way the U. S. Government is, it would incur almost certain defeat at the hands of an enemy or of its business competitors."

The commission would consist of four appointed by the President, two from the executive branch and two from private life; four appointed by the President pro tempore of the Senate, two from the Senate and two from private life; four appointed by the speaker of the House, two from the House and two from private life. Senate and House members each would consist of one Republican and one Democrat.

BRITAIN'S BIGGEST: *Brief details on this 24-cylinder Rolls Royce piston type engine have just been revealed. Developing 3500 hp, and fitted with sleeve valves, it has already undergone tests in a secret airplane built by Westland Aircraft Co.*



Wheel Tractor Output Up

Washington

• • • Farm-type wheel tractor production increased by nearly 3000 units over December to bring the total January production to 28,148 units, according to CPA figures. The monthly average for 1946 was about 21,500.

Of the January output, something over 21,000 units were available for domestic sales. Exports for January amounted to 14.3 pct including the 3.8 pct set-aside for UNRRA.

Predict Record Great Lakes Iron Ore Shipments This Year

Industry Hopes to Start Off On Apr. 1 and Ship More Than 80 Million Tons

By WILLIAM A. LLOYD
Cleveland Regional Editor

Cleveland

• • • **More than 80 million** tons of Lake Superior district iron ore, highest peacetime tonnage in Great Lakes history, will be moved to lower lake ports this year, according to reliable sources in the iron ore industry here.

While much depends on an early opening of navigation and no interruptions of the movement, with the steel industry's operating rate soaring to new peacetime records as a spur, iron ore executives are planning on an Apr. 1 start, even though ice-breaking may be necessary to bring the required tonnage down.

According to some observers, general weather conditions and ice on the lakes do not appear too promising for an Apr. 1 opening, and the movement of iron ore on the Great Lakes this year will be governed primarily by the available bottoms and the weather.

Other observers believe the mines will have some difficulty producing enough ore for an 80 million-ton season. The big pits can no longer do what they did during the war, and there is also a great shortage of equipment, shovels, tractors, etc., which will put a crimp in the output of some mines. Part of this equipment has been on order for 2 years. Manpower at the mines is generally considered to be adequate.

Although officials of the Lake Carriers Assn. have already discussed with the U. S. Coast Guard the possibility of ice-breaking to precede the opening of navigation Apr. 1, present iron ore inventories do not require a very early start.

On Feb. 1 about 30,500,000 tons of iron ore were on hand at U. S. and Canadian furnaces, and it has been estimated that about 17 million tons, or about 2 months' supply, will be on hand Apr. 1. Peak production in the iron and steel industry might have cut it down to 14 million tons, or even less, but the coal and steel strikes cut ore consumption sharply.

In the event of unforeseen storms and bad weather, however, some consumers could be short of some grades if navigation did not open until May 1. This is said to be very remote, however.

According to Lake Carriers' Association president, A. T. Wood, "iron ore stockpiled in blast furnace yards is being drained off at a rate that makes early resumption of Great Lakes shipping urgent this season.

"Each 9-month season the bulk cargo fleet is counted on to deliver all but a seventh of the iron ore this nation's steelmaking industry will use throughout the ensuing year. What remains of the ore supply brought down by the fleet from mines to blast furnaces last season is being consumed at a rate that is reaching all-time records," he pointed out.

"An early sailing date and full operation of the entire fleet without interruption until ice blocks the shipping lanes next winter will be needed to bring down enough iron ore for the steel industry to continue its support of the rising level of production and employment throughout U. S. industry," Mr. Wood declared.

While the fleet is in better shape than it has been at any start in recent years, following a winter of modernization, rehabilitation and repair, the iron ore industry firmly believes that fleet capacity will be the factor limiting the 1947 movement.

As of Sept. 15, 1946, trip capacity available from the U. S. fleet totaled 2,653,000 tons, with 2,643,000 tons in commission. In 1945, trip capacity was 2,759,000, with 2,653,000 in commission. According to sources in the trade, the reduction to 2,653,000 tons will make some difference.

Present capacity of the fleet means that 30 trips would be required to move 79 million tons of iron ore, which suggests that 80 million tons would be about the best the fleet could do in 30 trips. But if the fleet should make 32 trips, or 4 trips a month, 84 million tons could be brought down. Bad weather in the fall is always a possibility, and informed sources are not counting on U. S. boats for more than 80 million tons.

Canadian fleet tonnage is flex-

Industrial Briefs . . .

• BUYS SALES RIGHTS — The Clinton Machine Tool Co., Inc., of Clinton, Ind., have purchased from the Lincoln Tool Specialty Co. of Chicago, all the manufacturing and sales rights of the Eklind-Lincoln milling head.

• CONTRACT AWARDED — Work has begun on the change of catalyst and case repair on the four-case Houdry fixed-bed cat cracker at Socony-Vacuum's East Chicago, Ind., refinery, it has been announced. Contract for the work has been awarded to Catalytic Construction Co.

• ANNIVERSARY — The BullDog Electric Products Co. of Detroit this year celebrates its 45th anniversary. BullDog was established in 1902 as the Mutual Electric & Machine Co., in Wheeling, W. Va., manufacturing electrical controls.

• COPPER CASTINGS—Non Ferrous Foundries, Inc., Indianapolis, has installed facilities and perfected manufacturing techniques for the production of special heat treatable copper alloy castings made under a license arrangement with P. R. Mallory Co.

• OPENS NEW FIRM — Leo H. Rich has opened his own firm of industrial consultants to help American business coordinate its sales, product design and public relations. It will offer business clients a three-point "package program" of correlated economic and marketing research, industrial design and public relations "to build individuality and increase sales."

• CAN COMPANY EXPANDS—Continental Can Co., New York, has purchased Building No. 2 of the government supercharger plant at Milwaukee which was operated by the Allis-Chalmers Co. during the war, for $2,626,627 from the WAA. The new plant will be re-equipped and reconditioned for making metal containers for beer and other commodities and will employ about 1200 workers.

• STEEL CASKETS — Leake Stamping Co., Monroe, Mich., started production on 50,000 all-steel caskets to be used to bring deceased soldiers back to the United States. On Jan. 1, 1947, it is reported the company had orders for more than $2 million in stamping products on hand.

• BUYS COMPANY — Bath Iron Works, Bath, Me., has bought the outstanding stock of the Pennsylvania Crusher Corp., Philadelphia and will gradually take over contracts for the manufacture of heavy equipment.

• TO ASSEMBLE BUILDING—The contracting division of Dravo Corp. will furnish and erect a preassembled steel building for the A. M. Byers Co., at the company's Legionville Pump Station. The building will be carried to the site on barges and erected with the aid of a derrick boat.

• EXPORT ARRANGEMENTS—Autopulse Corp. of Detroit, a subsidiary of Borg-Warner International Corp. has concluded arrangements for the handling of the company's export activity. Export interest in electric fuel pumps for both automotive and household uses is reported at an all time high by the company.

• COMPLETES LAB—The completion of research laboratories and the addition of new machine tool equipment to facilitate the production of B-W Superchargers in the Pesco Products Division of Borg-Warner Corp. has been announced.

• ORGANIZES COMPANY — After serving with The National Screw & Manufacturing Co., Charles L. Kerr has resigned to organize the C. L. Kerr Industries, Inc., Cleveland. The new company will make screw machine products, specializing in short run quantities and will distribute nationally.

ible, but the bill permitting Canadian boats to haul U. S. ore between U. S. ports which was passed during the war, is still in effect. The Canadians hauled ore in 35 boats last year, carrying a total of about 2 million tons, although some boats carried only one ore cargo. In any event, the Canadians have quite a bit of capacity and could move a lot of ore.

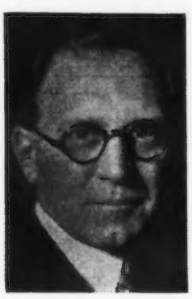
At the current rate of consumption, about 7 million tons a month, approximately 84 million tons of iron ore will be required this year. Underlying the requirement is the acute shortage of iron and steel scrap, which promises to get no better, bringing steel mills' pig iron needs into sharper focus.

Lurking on the horizon is another strike sponsored by the National Maritime Union and scheduled, according to "Pilot," the official organ of the union, for June 15. NMU's efforts last year were something less than 10 pct effective, and any serious interruption of the iron ore traffic from this source must be considered extremely remote.

National Acme Net Gains

Cleveland

• • • National Acme Co., with a total backlog of orders as of Jan. 1, 1947, only 8 pct below that of the same date in 1946, made a net profit of $2,615,754 for 1946 after federal taxes and compared with $1,789,881 for 1945, according to F. H. Chapin, president.



F. H. Chapin

Net is equal to $5.23 a share compared with $3.58 per share for 1945. Dividends amounting to $2.50 per share were paid during the war.

In his letter to shareholders, Mr. Chapin pointed out that foreign sales at the moment present a much confused aspect. Many customers would like to buy, but are prevented from so doing by their inability to finance such purchases, a condition which will undoubtedly prevail until international affairs are clarified, credits established and some tariff adjustments made, he stated.

Construction Steel . . .

New York

• • • **Fabricated steel awards** this week included the following:

6500 Tons, Buffalo, veterans' hospital, to Bethlehem Steel Co., Bethlehem, Pa., through Army Engineers.

6500 Tons, Albany, veterans' hospital, to Harris Steel Construction Co., New York City, through Army Engineers.

4500 Tons, Norristown, Pa. Philadelphia Electric Co., extension to Barbadoes Island power plant, to Bethlehem Steel Co., Bethlehem, Pa.

1275 Tons, Passaic River and Route 25-A, New Jersey Dept. of Highways, bridge, through Ole Hanson, to Mount Vernon Bridge Co., Mt. Vernon, Ohio.

245 Tons, El Segundo, Calif., machine shop for Standard Oil Co. of Calif., through Morrison-Knudsen Co. to Apex Steel Co., Los Angeles.

145 Tons, State of Iowa, 1947 bridge requirements to American Bridge Co., Pittsburgh.

• • • **Fabricated steel inquiries** this week included the following:

4000 Tons, Detroit, transmission towers for Detroit Edison Co.

3550 Tons, Island of Formosa, oil storage tank abandoned.

3500 Tons, Indiana and Michigan, transmission towers for Indiana and Michigan Electric Co.

2500 Tons, various locations, transmission towers for Toledo Edison Co.

2000 Tons, Alta Vista, Va., board plant for U. S. Gypsum Co.

600 Tons, Wichita, Kan., addition to coal building for Southwestern Bell Telephone Co.

450 Tons, Ocean Grove, N. J., Methodist Home for Aged, bids in.

350 Tons, Wilmington Calif., transit shed, berths 179-180, Harbor Dept., San Pedro, Spec. 1072, M. H. Golden Construction Co., San Diego, general contractor.

325 Tons, State of Illinois, eight 50-ft. beam spans for Santa Fe R. R.

300 Tons, Lawrence, Mass., plant addition for Beach Soap Co.

300 Tons, Scranton, Pa., Murray Corp., warehouse, A. A. Smith, general contractor.

265 Tons, Clearfield County, Pa. Pennsylvania Dept. of Highways, Route 59, section 10, bridge, Mar. 28.

200 Tons, Harrisburg, Pa., Pennsylvania Dept. of Highways, bridge, LR-53 section 7 in Cambria County, Mar. 28.

200 Tons, Philadelphia, Colgate-Palmolive-Peet Co., Turner Construction Co. taking bids.

200 Tons, Litchfield, Minn., power plant.

200 Tons, Cambridge, Mass., library for Harvard University, George A. Fuller Co., Boston, general contractor.

125 Tons, Philadelphia, C. Schmidt, Philadelphia, boiler house and machine shop, H. A. Kuljian Co., contractor.

• • • **Reinforcing bar awards** this week included the following:

300 Tons, Yakima Co., Wash., overcrossing over P.S.H. No. 3 at Selah Road, through Rumsey & Co., to Bethlehem Pacific Coast Steel Corp., San Francisco.

• • • **Reinforcing bar inquiries** this week included the following:

775 Tons, Wilmington, Calif., transit shed, berths 179-180, Harbor Dept., San Pedro, Spec. 1072, M. H. Golden Construction Co., San Diego, general contractor.

290 Tons, Multnomah Co., Ore., bridge over O.W.R.R. & N. Co. tracks at Bridal Veil on Columbia River highway, Oregon State Highway Commission, Portland, bids to Mar. 24.

165 Tons, Washington Co., Ore., overcrossing structures, Sunset Highway, Oregon State Highway Commission, Portland, bids to Mar. 25.

130 Tons, Colusa Co., Calif., bridge across Sacramento River, California Div. of Highways, Sacramento, bids to Apr. 2.

110 Tons, Prairie Du Chien, Wis., water reservoir, J. J. Duffy Co., Chicago, low bidder.

• • • **Plate inquiries** this week included the following:

150 Tons, Brewer, Me., standpipe for water district.

• • • **Rail inquiries** this week included the following:

150 Tons, Wilmington, Calif., transit shed, etc., berths 179-180, Harbor Dept., San Pedro, Spec. 1072, M. H. Golden Construction Co., San Diego, general contractor.

• • • **Railroad car awards** this week included the following:

Canadian National Ry. has placed orders for 48 Diesel-electric locomotives so far this year. Of the total, 18 will be built by the Electro-Motive Div. of General Motors Corp., at La Grange, Ill., and 10 by the American Locomotive Co., Schenectady, N. Y. Previous orders were for 18 locomotives to be built by Canadian Locomotive Co., Kingston, Ont. and 2 by the General Electric Co., Erie, Pa.

Warner & Swasey Has Slight Loss for 1946; Sales Were Also Down

Cleveland

• • • **Warner & Swasey Co.** has reported a net operating loss for the year 1946 of $162,109 which after a tax carry-back refund of $130,000, leaves a net loss of $32,-109. Total sales of $15,444,569 compared with sales of $28,-305,442 in 1945, when the net earnings were $1,187,285.

Mr. Stilwell

Charles J. Stilwell, president in his letter to shareholders, reported that factors contributing to the operating loss included strikes in the plants of suppliers, which forced the plant to close completely for 5 weeks during the first quarter; the over-all reduction in machine tool sales, resulting from the government's sale in 1946 of an estimated $46,000,000 worth of Warner & Swasey turret lathes from war surplus (as compared with the company's total 1946 machine tool sales of $13,631,751), and to the unusual expense incurred in research and development and the actual starting of new products within and outside the machine tool field.

"Our experience in 1946 lent confirmation to our estimate of the future possibilities of non-machine tool products. Until the end of the war it was impossible to give them real attention, and much work in research and development remained to be done in 1946 before these new products could be made ready for prospective markets. Our new non-machine tool products accounted for only $1,812,818 of our total sales for 1946, the sale of machine tools accounting for the remaining $13,631,751," Mr. Stilwell said.

Mr. Stilwell pointed out that machine tool sales during the year were on a descending scale. In the last quarter of 1946 government competition cut severely into the company's sales and confirmed the decision to spend on research in new products, both within and outside the machine tool field, a substantial amount of the company's earnings from machine tools.

Crystallographic Group Holds Annual Meeting

New York

• • • **The 1947 Spring Meeting** of the Crystallographic Society will be held at the Postgraduate School, U. S. Naval Academy, Annapolis, Md., Mar. 19-21. The present membership of the society numbers approximately 200, including not only crystallographers, but scientists of other fields such as mineralogy, petrology, metallurgy, biology, chemistry, physics and geology.

Prof. J. W. Gruner, University of Minnesota, is president of the society; Prof. A. Pabst, University of California, is vice-president, and Dr. W. Parrish of Philips Laboratories, Inc., Irvington, N. Y., is secretary-treasurer.

A total of 28 technical presentations will be made during the session, which will be terminated with the annual banquet, Friday, Mar. 21. The banquet will be highlighted with a talk by Rear Admiral J. L. Holloway, Supt., U. S. Naval Academy.

MACHINE TOOLS

. . . News and Market Activities

Expects Activity in Detroit Machine Tool Output To Be Resumed

• • • **In Detroit** there are indications this week that renewed activity in production of machine tools may be close at hand. While backlogs for standard machine tools are being whittled down constantly, Detroit builders of specialized equipment continue to report a satisfactory bank of orders on hand. According to some sources there has been a noticeable pickup in machine tool ordering by several automobile producers during the past several weeks which can be taken as an indication that plans for 1948 models may be crystallizing.

In other areas, standard, general purpose machine tools, either in short supply or not available in surplus, are being ordered in substantial quantities by buyers, foreign and domestic.

Foreign business continues as a substantial part of the volume of several major Detroit producers. WAA is now operating under new management in Detroit and has announced plans to reopen its largest warehouses this week after a 7-day closing to catch up on paper work.

In Cleveland, sales of government-owned machine tool and metalworking equipment in the area for January and February of this year have more than doubled over a comparable period in the last quarter of 1946, according to the WAA.

Based upon acquisition costs, $3,463,731 worth of equipment was sold so far this year compared with $1,390,686 for last October and November, giving strong indication that new disposal policies are speeding the liquidation of WAA's huge machine tool stockpile. Current rate of recovery is 30 pct of cost.

A 12½ pct price discount on surplus standard general purpose machine tools is now being granted by Cleveland WAA to machine tool rebuilders, manufacturers, exporters, dealers or other distributors who purchase for resale.

Reports Government Sales Of Tools in Cleveland Have More Than Doubled

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The discount is expected to promote the export of surplus machine tools, to accelerate disposals in the domestic market and to encourage rebuilders and manufacturers of machine tools to purchase for their own account for rebuilding and resale.

The existing WAA "approved dealers" program is not modified by this new sales policy. Those approved dealers making sales to users will continue to receive a 12½ pct commission for their services, but if an approved dealer purchases surplus machine tools for his own account for resale, he will get the 12½ pct discount and no commission.

In order to qualify for the discount, the buyer must certify that he makes the purchase for the purpose of resale either with or without rebuilding the equipment.

IN NEW JOB: *Alvin L. Krieg has been appointed assistant to the general manager, National Machine Tool Builders' Assn. A former newspaperman, Mr. Krieg was assistant to the director of public relations, American Steel & Wire Co., prior to joining NMTBA.*

In Cincinnati, machine tool builders are still in the doldrums, concerning domestic business, which continues very slow. There was some indication that foreign business rallied slightly in some fields, with an influx of ordering.

Builders in Cincinnati are looking forward to the Machine Tool Show to be held in September at Chicago in order to give the business a "shot in the arm." Various sources here have indicated that there will be many new ideas and machines shown and that these new tools will stimulate buying.

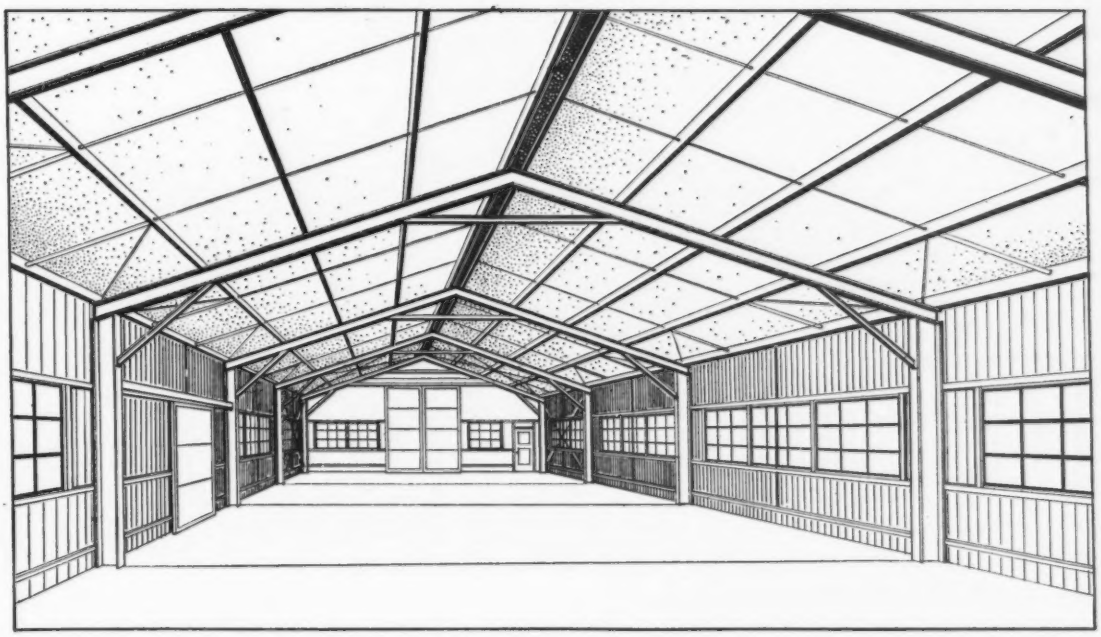
Swan Bergstrom, sales manager, Cincinnati Milling Machine Co., is the chairman of the National Machine Tool Builders Assn. show.

General Machinery Corp., Hamilton, Ohio, added new lines of production during 1946, and the annual report showed net earnings of $902,298, according to a statement by G. A. Rentschler, president.

In Boston and the East, February sales as reported by a majority of manufacturers were better than January. January, of course, at best is one of the leanest months. February sales as compared with February last year were, in the main, smaller. The disparity ranges all the way from 2½ pct to 10 pct, generally from 2½ pct to 5 pct. Some isolated cases were actually about 10 pct better than February last year. Of the business done in February, 60 pct to 85 pct was domestic. while 15 pct to 40 pct was export.

LURIA STANDARD BUILDINGS

NOW IN PRODUCTION FOR EARLY DELIVERY



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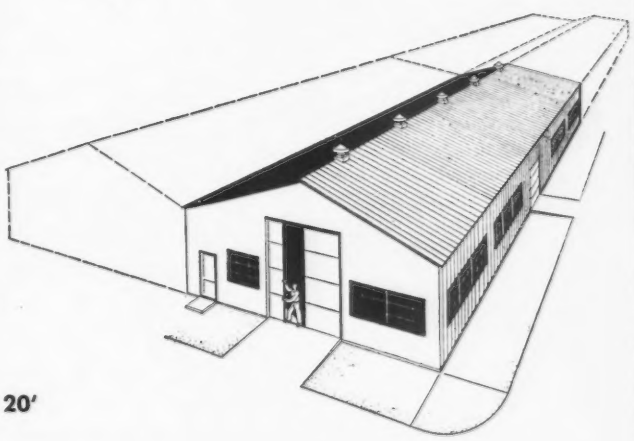

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NONFERROUS METALS

. . . News and Market Activities

U.K. Will Get 75 Pct Of Canada's Copper Surplus

Toronto

• • • **Canadian primary** copper remains in short supply, with the 1947 exportable surplus already committed, according to the Dept. of Trade and Commerce. Of Canada's exportable copper surplus. 75 pct will be taken by the United Kingdom. Copper mill products, such as sheets, coils, tubes and plates, continue tight. Manufacturers of wire and cable have no material for new accounts. On old orders delivery is anywhere up to 18 months, depending upon sizes and types.

Antimony is in very short supply, as exports from the United States have been discontinued. There were no exports in October, and the shortage is estimated to be 2 million lb. Canada now is dependent upon supplies from China.

Primary aluminum is available for export in fairly substantial quantities. Delivery on semi-fabricated forms remains poor. A shortage of secondary aluminum is developing, owing to the exceptional demand in the United States for scrap.

•

Raise Tungsten Again

New York

• • • **Rising ore costs** have forced further revisions in the prices of ferrotungsten and tungsten powder, Electro Metallurgical Sales Corp. has announced. The new prices are effective Apr. 1 on a contract basis and immediately on a spot basis.

Ferrotungsten prices are increased 10¢ per lb of contained tungsten, making the new Eastern Zone contract price $2.08 in lots of 10,000 lb or more of contained tungsten. Tungsten powder prices are increased 15¢ per lb for the melting grade, making the new price $2.80 in the Eastern Zone in lots of 1000 lb or more. Quantity, zone, and spot differentials remain unchanged.

•

Copper

• • • **On Saturday** the Kennecott Copper Co. followed the action of all other producers taken five days earlier by advancing the price of electrolytic copper to the present market of 21.50¢ per lb delivered Connecticut Valley.

The major interest among producers and consumers at this time is the action of the House Ways and Means Committee in reporting out to the floor of the House on Mar. 10 Representative Patterson's bill which would repeal the tariff on imports of copper. The trade points out that there is a long road to travel before the bill becomes law and in the meantime the shortage of copper for domestic consumers is likely to grow more acute than at present. The price increase on primary copper has been followed by corresponding increases in the price of scrap. It is expected that there may be some improvement in shipments of scrap to dealers and smelters which will be reflected in higher production figures.

•

Lead

• • • **The recent price** increases bringing lead delivered to New York to 15¢ per lb are being firmly adhered to by all producers and in the present short supply position of lead there is small possibility of any downward modification. If any further price development is to be expected, it must be in the direction of a higher price. Smelters are anticipating that the higher scrap prices now prevailing may be expected to bring out larger tonnages to dealers and smelters. Another expectation of some ease in the unbalanced supply-demand relationship is that the pipelines of distributors and fabricators may soon be filled up. It is also probable that there may be some transfer of demand from lead to other cheaper metals in better supply.

•

Copper Production Rises

Toronto

• • • **Following settlement** of the strike at the base metal mines in Quebec, copper production in Canada again is moving upward and is expected to return to a normal basis within the next month or six weeks. Officials of Noranda Mines Ltd., Canada's major copper producer, announced that the smelter at Noranda has resumed operations after the long shutdown, and the concentrator will be started in a few days, to be followed by the mill as soon as sufficient ore is available to provide millfeed. Customs shipments of copper concentrates have been resumed by Waite-Amulet Mines, Normetal Mines and Mic Mac Mines Ltd.

Canadian copper production for November amounted to 35,414,485 lb—the highest monthly total since August 1945—and compares with 30,232,466 lb in October and 32,239,787 for November 1946, the Dominion Bureau of Statistics reports. For the first 11 months of 1946 copper production totaled 341,278,944 lb compared with 443,019,969 lb, in the like period of 1945.

Primary production of lead in November was 22,679,455 lb compared with 29,745,248 lb in October and 35,000,437 lb in November 1946. Total lead ouput for the 11 months was 330,896,182 lb compared with 314,694,027 lb in the same period of 1945.

Nonferrous Metals Prices

Cents per pound

	Mar. 5	Mar. 6	Mar. 7	Mar. 8	Mar. 10	Mar. 11
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	14.80	14.80	14.80	14.80	14.80	14.80

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb)	15.00
Aluminum pig, f.o.b. shipping point	14.00
Antimony, American Laredo Tex.	28.25
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be	$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be	$27.50
Cadmium, del'd	$1.75
Cobalt, 97-99% (per lb)	$1.50 to $1.57
Copper, electro, Conn. Valley	21.50
Copper, lake, Conn. Valley	21.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$110.00
Lead, St. Louis	14.80
Lead, New York	15.00
Magnesium, 99.8+%	20.50
Magnesium, sticks, carlots	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$88 to $90
Nickel, electro, f.o.b. New York	37.67
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$58 to $61
Silver, New York, cents per oz.	83.75
Tin, Straits, New York	70.00
Zinc, East St. Louis	10.50
Zinc, New York	11.005
Zirconium copper, 6 pct Zr, per lb contained Zr	$6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115	21.50
No. 120	21.00
No. 123	20.50
80-10-10 ingot	
No. 305	24.50
No. 315	23.00
88-10-2 ingot	
No. 210	27.25
No. 215	26.25
No. 245	23.50
Yellow ingot	
No. 405	17.00
Manganese Bronze	
No. 421	19.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys:	
0.30 copper max.	17.75—18.00
0.60 copper, max.	17.50—17.75
Piston alloys (No. 122 type)	16.25—16.50
No. 12 alum. (No. 2 grade)	15.50—15.75
108 alloy	15.75—16.00
195 alloy	16.25—16.50
AXS-679	15.75—16.00
Steel deoxidizing aluminum, notch-bar, granulated or shot	
Grade 1—95 pct-97½ pct	16.75—17.00
Grade 2—92 pct-95 pct	15.75—16.00
Grade 3—90 pct-92 pct	15.25—15.50
Grade 4—85 pct-90 pct	14.75—15.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	36⅞
Electrodeposited	31⅝
Rolled, oval, straight, delivered	32⅛
Brass, 80-20, frt allowed	
Cast, oval, 15 in. or longer	33
Zinc, Cast, 99.99	18¾
Nickel, 99 pct plus, frt allowed	
Cast	51
Rolled, depolarized	52
Silver, 999 fine	
Rolled, 1000 oz lots, per oz.	88¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	40.50
Copper sulphate, 99.5, crystals, bbls	11.50
Nickel salts, single, 425 lb bbls, frt allowed	14.50
Silver cyanide, 100 oz. lots, per oz	70⅞
Sodium cyanide, 96 pct, domestic, 200 lb drums	15.00
Zinc cyanide, 100 lb drums	34.00
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed	7.75

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 52S, 24.2¢ 61S, 23.3¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 28¢; 63S, 27¢; 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. *Rod:* 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. *Round Wire:* drawn, coiled, B & S gage 17-18; 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base. B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb. f.o.b. mill)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, $1.25-$1.31; 24, $1.71-$1.75. Base quantity 30,000 lb.

Round Rod: M, diam in. ⅛, 55¢; ¼, 47¢ ⅜, 46¢; ½, 45¢; ¾, 44¢; 1¾, 43.5¢; 2, 42.5¢; 3, 41.5¢; 4, 42.5¢ 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ⅛, 58¢; ¼, 50¢; ⅜, 48¢; ½, 47.5¢; ¾, 46.5¢; 1¾, 45.5¢; 2, 44.5¢; 3, 43.5¢; 4 & 5 in. 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets	..	41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks	..	31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.	15.50
Ribbon, ton lots	14.50
Plates	
Small	13.25
Large, over 12 in.	14.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	32.78	....	32.93
Copper, hot rolled	....	29.28	....
Copper, drawn	....	30.28	....
Low brass	39.13	30.32	30.63
High brass	37.38	28.57	28.88
Red brass	39.74	30.93	31.24
Naval brass	28.73	27.48	33.42
Brass, free cutting	27.23	23.64	....
Commercial bronze	40.86	32.05	32.36
Manganese bronze	32.28	30.78	36.92
Phosphor bronze, 5 pct.	....	51.00	50.75
Muntz metal	28.42	27.17	31.61
Everdur, Herculoy Olympic, etc.	36.30	36.65	37.71
Nickel silver, 5 pct.	40.54	39.53	37.92
Architectural bronze	27.23	....	....

Scrap Metals

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Brass Mill Scrap

(Lots of 15,000 lb or less)

Cartridge brass turnings	14⅞
Loose yellow brass trimmings	15¾

Copper and Brass

No. 1 heavy copper and wire	16½—17
No. 2 heavy copper and wire	15½—16
Light copper	14½—15
Auto radiators (unsweated)	10¾—11¼
No. 1 composition	14 —14¼
No. 1 composition turnings	13 —13¼
Clean red car boxes	12 —12½
Cocks and faucets	11¼—11¾
Mixed heavy yellow brass	9¾—10¼
Old rolled brass	9½—10
Brass pipe	11½—11¾
New soft brass clippings	13 —13½
Brass rod ends	12¼—12½
No. 1 brass rod turnings	11½—12

Aluminum

Alum. pistons with struts	4½—5
Aluminum crankcases	6¾—7
2S aluminum clippings	8¼—8½
Old sheet & utensils	6¾—7
Mixed borings and turnings	2½—3
Misc. cast aluminum	6¼—6¾
Dural clips (24S)	5¾—6

Zinc

New zinc clippings	7 — 7½
Old zinc	5¼ — 5¾
Zinc routings	3 — 3½
Old die cast scrap	3 — 3¼

Nickel and Monel

Pure nickel clippings	22 —23
Clean nickel turnings	17 —18
Nickel anodes	19½—20½
Nickel rod ends	20 —21
New Monel clippings	14 —15
Clean Monel turnings	9 —10
Old sheet Monel	12 —12½
Old Monel castings	10 —11
Inconel clippings	10 —11
German silver clippings, mixed	10½—11
German silver turnings, mixed	7 — 7¼

Lead

Soft scrap lead	12 —12½
Battery plates (dry)	7 — 7½

Miscellaneous

Block tin	60
No. 1 pewter	46 —48
No. 1 auto babbitt	35 —36
Mixed common babbitt	12 —12¼
Solder joints	13¼—13¾
Siphon tops	38 —39
Small foundry type	15 —15½
Monotype	13½—14
Lino and stereotype	12 —13
Electrotype	11 —12
New type shell cuttings (nom)	13 —13½
Clean hand picked type shells	5½— 6
Lino and stereo dross	6 — 6½
Electro dross	4 — 4½

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.

Full lead sheets	18.25
Cut lead sheets	18.75
Lead pipe, manufacturing point	17.50
Lead traps and bends	List +42%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules	List +42%
Lead wool	19.50

SCRAP

Additional Gains Posted in Major Centers

New York

• • • **The market continued** its chaotic scramble onto higher ground this week, posting healthy gains in most major steel scrap centers. Heavy openhearth material moving locally in Pittsburgh was up $3 to $38; that coming in from outside the district was up fractionally to $41. In Chicago the story was almost the same, a $2.50 local advance and a $1 rise on scrap coming in from outside the area.

Again for the heavier grades, broker's buying prices were up $2 in New York, $1 in Boston. Delivered prices were $2 higher at the top of the range in the Philadelphia district, while in Cleveland and the Valley the purely local market moved up though the imported material held steady.

Heading the sensational side of this week's lists was the rise in railroad specialties which meant a gain in the Pittsburgh delivered price from the former $38 to $38.50 bracket to a $45 to $46 bracket.

Trade sources agree that the introduction of large war surplus and battlefield scrap lists into the current market would probably reverse the current price spiral. However, neither is expected to be a factor for some time to come.

•

PITTSBURGH — With local scrap moving out of this area at the $35 a ton local price in effect last week, consumers here moved the price up to $38 a ton to meet this competition. The New York Central and Pittsburgh & Lake Erie railroad scrap lists went for $37.50 a ton, plus brokerage fees, in this area, which is comparable to the new $38 a ton local market. The specialty items on these lists, however, moved from the $38 to $38.50 range to $45 to $46 a ton, where the bulk of the scrap from the two lists was sold. The turnings market moved along with the steel prices and a purchase by a local consumer of out-of-district short turnings forced a $2 a ton spread in this price. Other turnings grades continue at the $1 a ton spread. The cast market is weaker because scrap interests are meeting buying resistance from the foundries. The low phos market is an enigma, with some moving on No. 1 steel scrap orders and some moving at higher prices offered by distressed customers who need the material. Prices as high as $43 a ton have been paid and dealers have made offerings of low phos for as high as $45 a ton.

CHICAGO — The raise last week in heavy melting prices was enforced across the board on other steel items with the exception of rail items which have fluctuated independently for some time. Due to overgrading, the electric furnace items have not reflected the going price for this grade for the past few weeks. For some time different consumers have been reporting that they have been paying $38 to $42 for prime quality electric furnace plate and punchings. In recognition of these facts one large steel producer last week was forced to raise its price of plate wasters to 75 pct of the prime plate price to keep the price of this commodity above that of low phos plate scrap. Some buyers are still able to buy alleged electric furnace scrap at $38.50 a gross ton delivered, but shops that must have the real thing report they must pay around $44.50 or accept run of mine heavy melting material.

•

PHILADELPHIA — All scrap grades moved at higher prices in this district last week. Heavy melting grades reached $39 to $40, an average increase of $2.50. Low phos and railroad specialties were sold at $3.00 differential above heavy melting. Cast grades were up to a range of $48 to $50, with isolated sales reported as high as $52. Turnings were up to $29 to $30, with shoveling $1 higher. Some mills report that scrap shipments have definitely improved after the holdup due to snows and cold weather.

•

NEW YORK — Heavy openhearth steel scrap prices jumped another $2 higher during the past week, with no indication of weakness at this time. Scrap brokers were almost unanimous in their belief that current quotations would look low by the end of the week. Turnings were up $1 and cast grades were also stronger. With spring just around the corner brokers here assayed the winter's effect on scrap as very small and most sources reported shipments good during the past week.

•

DETROIT — While scrap prices here remained virtually unchanged for the first time in several weeks, significant shifts in market conditions are reported to be taking place that may lead to significant price changes. For example, mill buyers of industrial scrap were said to be buying on open order rather than on firm orders used heretofore. Such hand-to-mouth buying has naturally tended to focus attention on daily transactions rather than on longer term commitments. Today's higher prices and expected improvement in the weather may increase substantially the volume of scrap available within the next 30 days. Foundry grades, reported easier in recent weeks, are tighter with clean auto cast reported bringing as high as $50 per gross ton.

•

CLEVELAND — Confusion reigns supreme over scrap prices, which are now so high that some consumers are trying to get out of the market. Shipments to mills are good, and with better weather on the way, even better shipments are expected. Present prices preclude mills putting much on the ground, even if the scrap was available in sufficient quantities. Some consumers believe present prices are good for another 30 to 60 days, which remains to be seen, as any resistance thus far has been obviously ineffective.

•

BOSTON—Prices are firm and about $1 a ton higher, but the trade is less excited and has the same idea of prices for this or that item. To illustrate, there is no spread on heavy steel; it is plain $33 a ton. Likewise, there is but one price on shoveling and machine shop turnings and mixed borings and turnings. A Providence concern again reports sales of cast delivered to a local consumer at $50 a ton. General market remains at $40 to $45 a ton.

•

BUFFALO — Leading consumers had failed to follow advances in other markets at the start of the week, but it was obvious that no new business in openhearth grades could be done locally at $35 Despite small receipts, mills were breaking fairly even on scrap by using an unusually high percentage of hot iron. Railroad specialties were nonexistant because of unwillingness to pay over $37, although the latest offerings went to Chicago on a bid of $44.40.

•

CINCINNATI—The market in this area continues strong, with prices up $2 this week on heavy melting grades. Consumers, by and large, appear to be in fair shape on inventories, but interest in continued purchases is unabated. Shipments have been slowed down in the last several weeks, primarily because of weather conditions and the shortage of freight cars.

•

ST. LOUIS—Two of the largest mills came into the market this week, offering $2 more for heavy melting steel, with proportional increases in most other grades. Local mills, getting only 70 pct of their needs, made the increase to meet outside competition.

•

BIRMINGHAM — Prices on heavy melting grades here were holding at the beginning of the week but further increases were anything but unlikely as pressure from northern mills became even more intense. Despite northern competition, southern mills have been able to get sufficient material thus far to meet needs.

•

TORONTO — All movement of scrap iron and steel was brought to a standstill during the week, when both rail and motor transportation were blocked by record snow drifts throughout Ontario and Quebec. Local dealers reported no action in the scrap markets and receipts virtually disappeared. Steel mills, depending on stockpiles for current needs, are rapidly depleting supplies. Foundries are out of scrap and are unable to pick up cast or stove plate.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $41.00
RR. hvy. melting	37.50 to 38.00
No. 2 hvy. melting	38.00 to 41.00
RR. scrap rails	41.00 to 42.00
Rails 3 ft. and under	43.50 to 44.50
No. 1 comp'd bundles	38.00 to 41.00
Hand bdld. new shts.	38.00 to 41.00
Hvy. axle turn.	38.00 to 41.00
Hvy. steel forge turn.	38.00 to 41.00
Mach. shop turn.	30.00 to 31.00
Short shov. turn.	31.00 to 33.00
Mixed bor. and turn.	30.00 to 31.00
Cast iron borings	30.00 to 31.00
No. 1 cupola cast	41.00 to 42.00
Heavy breakable cast	36.00 to 37.00
Malleable	39.00 to 40.00
RR. knuck. and coup.	45.00 to 46.00
RR. coil springs	45.00 to 46.00
Rail leaf springs	45.00 to 46.00
Rolled steel wheels	45.00 to 46.00
Low phos.	42.00 to 43.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.50 to $39.00
No. 2 hvy. melting	35.50 to 39.00
No. 1 bundles	35.50 to 39.00
No. 2 dealers' bundles	35.50 to 39.00
Bundled mach. shop turn	35.50 to 39.00
Galv. bundles	33.50 to 34.00
Mach. shop turn.	29.50 to 31.00
Short shov. turn.	32.50 to 33.00
Cast iron borings	31.50 to 32.00
Mix. borings & turn.	29.50 to 31.00
Los. phos. hvy. forge	40.00 to 41.50
Low phos. plates	38.50 to 44.50
No. 1 RR. hvy. melt.	36.50 to 37.00
Rerolling rails	44.75 to 45.50
Miscellaneous rails	41.50 to 43.00
Angles & splice bars	42.00 to 43.00
Locomotive tires, cut	40.00 to 43.00
Cut bolster & side frames	39.00 to 40.00
Standard stl. car axles	43.00 to 44.00
No. 3 steel wheels	39.50 to 40.00
Couplers & knuckles	43.50 to 45.00
Malleable	45.00 to 49.00
No. 1 mach. cast	45.00 to 46.00
Rails 2 ft. and under	48.00 to 49.00
No. 1 agricul. cast	38.50 to 39.00
Hvy. breakable cast	37.50 to 38.00
RR. grate bars	40.00 to 40.50
Cast iron brake shoes	40.00 to 42.00
Stove plate	41.00 to 42.00
Cast iron carwheels	39.00 to 40.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.00 to $38.00
No. 2 hvy. melting	36.00 to 38.00
No. 1 bundles	36.00 to 38.00
No. 2 bundles	36.00 to 38.00
Mach. shop turn.	30.00 to 31.00
Shoveling turn.	30.00 to 32.00
Cast iron borings	29.00 to 31.00
Mixed bor. & turn.	29.00 to 31.00
Low phos. plate	40.00 to 42.00
No. 1 cupola cast	49.00 to 50.00
Hvy. breakable cast	35.00 to 36.00
Stove plate	31.00 to 32.00
Scrap rails	40.00 to 41.00

BOSTON

Dealers' buying prices per gross ton. f.o.b. cars

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	33.00
Nos. 1 and 2 bundles	33.00
Busheling	33.00
Turnings, shovelings	28.00
Machine shop turn.	26.00
Mixed bor. & turn.	26.00
Cl'n cast. chem. bor.	$28.00 to 29.00
No. 1 machinery cast	40.00 to 45.00
No. 2 machinery cast	40.00 to 45.00
Heavy breakable cast	40.00 to 45.00
Stove plate	40.00 to 45.00

DETROIT

Per gross, ton, brokers' buying prices, f.o.b. cars:

No. 1 hvy. melting	$34.75 to $35.25
No. 2 hvy. melting	34.75 to 35.25
No. 1 bundles	34.75 to 35.25
New busheling	34.75 to 35.25
Flashings	34.75 to 35.25
Mach. shop turn.	25.50 to 26.00
Short shov. turn.	26.50 to 27.00
Cast iron borings	$25.50 to $26.00
Mixed bor. & turn.	25.50 to 26.00
Low phos. plate	36.75 to 37.25
No. 1 cupola cast	41.25 to 45.25
Hvy. breakable cast	37.25 to 39.25
Stove plate	37.25 to 39.25
Automotive cast	48.50 to 50.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	39.00 to 40.00
Mach. shop turn.	29.00 to 30.00
Shoveling turn.	30.00 to 31.00
Mixed bor. & turn.	29.00 to 30.00
Clean cast chemical bor.	32.00 to 34.00
No. 1 cupola cast	48.00 to 50.00
Hvy. breakable cast	46.00 to 47.00
Cast. charging box	46.00 to 47.00
Clean auto cast	48.00 to 50.00
Hvy. axle forge turn.	39.00 to 40.00
Low phos. plate	42.00 to 43.00
Low phos. punchings	42.00 to 43.00
Low phos. bundles	41.00 to 42.00
RR. steel wheels	42.00 to 43.00
RR. coil springs	42.00 to 43.00
RR. malleable	48.00 to 50.00

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages. Where substantial tonnages of open hearth grades come into a consuming district from outside of that district, the upper range of the price quoted here is the representative average delivered price of the bulk of this incoming material.

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00 to $36.00
Bundled sheets	35.00 to 36.00
Mach. shop turn.	30.00 to 31.00
Locomotive tires, uncut	37.00 to 38.00
Mis. std. sec. rails	38.00 to 39.00
Rerolling rails	41.00 to 42.00
Steel angle bars	39.00 to 40.00
Rails 3 ft. and under	40.00 to 41.00
RR. springs	40.00 to 41.00
Steel car axles	37.00 to 38.00
Stove plate	35.00 to 36.00
Grate bars	35.00 to 36.00
Brake shoes	35.00 to 36.00
Malleable	42.00 to 43.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast	39.00 to 40.00
Breakable cast	37.00 to 38.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	33.00
No. 2 bundles	33.00
No. 1 busheling	33.00
Long turnings	$23.00 to 23.50
Shoveling turnings	27.50 to 28.00
Cast iron borings	24.00 to 24.50
Bar crops and plate	35.00 to 37.50
Structural and plate	35.00 to 37.50
No. 1 cast	37.50 to 42.50
Stove plate	35.00 to 36.00
Steel axles	35.50 to 36.00
Scrap rails	33.00 to 34.00
Rerolling rails	38.00 to 39.00
Angles & splice bars	37.00 to 38.00
Rails 3 ft. & under	38.00 to 41.00
Cast iron carwheels	32.00 to 32.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $42.50
No. 2 hvy. melting	38.00 to 42.50
Low phos. plate	42.00 to 45.00
Mach. shop turn.	31.50 to 32.00
Short. shov. turn.	32.50 to 33.00
Cast iron borings	32.50 to 33.00
Elec. furnace punch	42.00 to 45.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	36.00
Comp. black bundles	36.00
Comp. galv. bundles	34.00
Mach. shop turn.	$26.50 to 27.00
Mixed bor. & turn.	26.50 to 27.00
Shoveling turn.	28.50 to 29.00
No. 1 cupola cast	43.00 to 45.00
Hvy. breakable cast	41.00 to 43.00
Charging box cast	$41.00 to $43.00
Stove plate	41.00 to 43.00
Clean auto cast	41.00 to 43.00
Unstrip. motor blks	39.00 to 41.00
Cl'n chem. cast bor.	29.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	35.00
No. 1 bundles	35.00
No. 2 bundles	35.00
Mach. shop turn.	$28.00 to 29.00
Shoveling turn.	30.00 to 31.00
Cast iron borings	27.00
Mixed bor. & turn.	28.00 to 29.00
No. 1 cupola cast	35.00 to 40.00
Charging box cast	29.00 to 30.00
Stove plate	30.00 to 35.00
Clean auto cast	35.00 to 40.00
Malleable	45.00 to 47.00
Low. phos. plate	36.00 to 37.00
Scrap rails	30.00 to 32.00
Rails 3 ft. & under	38.00 to 40.00
RR. steel wheels	37.00 to 38.00
Cast iron carwheels	35.00 to 38.00
RR. coil & leaf spgs.	36.00 to 37.00
RR. knuckles & coup.	36.00 to 37.00
No. 1 busheling	35.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $39.50
No. 2 hvy. melting	37.50 to 39.50
Compressed sheet stl.	37.50 to 39.50
Drop forge flashings	37.50 to 39.50
No. 2 bundles	37.50 to 39.50
Mach. shop turn.	30.00 to 31.00
Short shovel	31.00 to 32.00
No. 1 busheling	37.50 to 39.50
Steel axle turn.	37.50 to 39.50
Cast iron borings	28.00 to 28.50
Mixed bor. & turn.	28.00 to 28.50
No. 1 machinery cast	40.00 to 45.00
Malleable	42.50 to 45.00
Railroad cast	40.00 to 45.00
Railroad grate bars	35.00 to 37.00
Stove plate	37.50 to 38.00
RR. hvy. melting	34.00 to 34.50
Rails 3 ft. & under	43.00 to 44.00
Rails 18 in. & under	44.00 to 45.00
Rails for rerolling	42.00
Elec. furnace punch	41.50 to 44.50

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	25.00
No. 1 cupola cast	$32.00 to 33.00
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	14.50
No. 1 cupola cast	$35.00 to 36.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melting	$20.00
Elec. furn. 1 ft. und.	22.50
No. 1 cupola cast	29.00
RR. hvy. melting	21.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushelings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

* Ceiling price

Comparison of Prices . .

[Advances over past week in **Heavy Type**, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.]

Flat-Rolled Steel: (cents per pound)	Mar.11, 1947	Mar. 4, 1947	Feb. 11, 1947	Mar. 12, 1946
Hot-rolled sheets	2.50	2.50	2.50	2.425
Cold-rolled sheets	3.20	3.20	3.20	3.275
Galvanized sheets (10 ga.)	3.55	3.55	3.55	4.05*
Hot-rolled strip	2.50	2.50	2.50	2.35
Cold-rolled strip	3.20	3.20	3.20	3.05
Plates	2.65	2.65	2.65	2.50
Plates, wrought iron	5.95	5.95	5.95	4.112
Stain's c-r strip (No. 302) *24 ga	30.30	30.30	30.30	28.00
Tin and Terneplate: (dollars per base box)				
Tinplate, standard cokes.	$5.75	$5.75	$5.75	$5.00
Tinplate, electro (0.50 lb)	5.05	5.05	5.05	4.50
Special coated mfg. ternes	4.90	4.90	4.90	4.30
Bars and Shapes: (cents per pound)				
Merchant bars	2.60	2.60	2.60	2.50
Cold-finished bars	3.20	3.20	3.20	3.10
Alloy bars	3.05	3.05	3.05	2.92
Structural shapes	2.50	2.50	2.50	2.35
Stainless bars (No. 302)	26.00	26.00	26.00	24.00
Wrought iron bars	6.15	6.15	6.15	4.76
Wire and Wire Products: (cents per pound)				
Bright wire	3.30	3.30	3.30	3.05
Wire nails	3.75	3.75	3.75	3.25
Rails: (dollars per 100 lb)				
Heavy rails	$2.50	$2.50	$2.50	$43.39*
Light rails	2.85	2.85	2.85	49.18*
*per net ton				
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$42.00	$42.00	$42.00	$39.00
Sheet bars	50.00	50.00	50.00	38.00
Slabs, rerolling	42.00	42.00	42.00	39.00
Forging billets	50.00	50.00	50.00	47.00
Alloy blooms, billets, slabs	61.00	61.00	61.00	58.43
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.55	2.55	2.55	2.30
Skelp	2.35	2.35	2.35	2.05

Pig Iron: (per gross ton)	Mar.11, 1947	Mar. 4, 1947	Feb. 11, 1947	Mar. 12, 1946
No. 2, foundry, Phila.	$36.51	$36.51	$32.51	$27.59
No. 2, Valley furnace	33.50	33.50	30.50	25.75
No. 2, Southern, Cin'ti	34.75	31.75	31.75	26.19
No. 2, Birmingham	29.88	26.88	26.88	22.13
No. 2, foundry, Chicago†	33.00	33.00	30.50	25.75
Basic, del'd eastern Pa.	36.92	35.67	33.67	27.09
Basic, Valley furnace	33.00	33.00	30.00	25.25
Malleable, Chicago†	33.50	33.50	30.50	25.75
Malleable, Valley	33.50	33.50	30.50	25.75
Charcoal, Chicago	45.99	42.99	42.99	42.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$39.50	$37.88	$35.50	$20.00
Heavy melt'g steel, Phila,	39.50	37.00	33.50	18.75
Heavy melt'g steel, Ch'go	37.25	35.00	32.25	18.75
No. 1, hy. comp. sheet, Det.	35.00	35.00	28.50	17.32
Low phos. plate, Youngs'n	43.50	41.75	37.25	22.50
No. 1, cast, Pittsburgh	*41.50*	42.50	42.50	20.00
No. 1, cast, Philadelphia.	49.00	46.00	46.00	20.00
No. 1, cast, Chicago	44.25	44.25	44.25	20.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$9.00	$9.00	$8.75	$7.50
Foundry coke, prompt	10.25	10.25	8.50	9.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro., Conn.	21.50	21.50	19.75	12.00
Copper, Lake, Conn.	21.625	21.625	19.625	12.00
Tin, Straits, New York	70.00	70.00	70.00	52.00
Zinc, East St. Louis	10.50	10.50	10.50	8.25
Lead, St. Louis	14.80	14.80	12.80	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	37.67	37.67	37.67	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	28.25	28.25	28.25	14.50

Composite Prices . .

[Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.]

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Mar. 11, 1947	2.86354¢ per lb.	$33.15 per gross ton	$38.75 per gross ton
One week ago	2.86354¢ per lb.	$32.23 per gross ton	$36.67 per gross ton
One month ago	2.86354¢ per lb.	$30.15 per gross ton	$33.75 per gross ton
One year ago	2.54490¢ per lb.	$25.37 per gross ton	$19.17 per gross ton

	HIGH		LOW	
1947	2.86354¢		2.86354¢	
1946	2.83599¢	Dec. 31	2.54490¢	Jan. 1
1945	2.44104¢	Oct. 2	2.38444¢	Jan. 2
1944	2.30837¢	Sept. 5	2.21189¢	Oct. 5
1943	2.29176¢		2.29176¢	
1942	2.28249¢		2.28249¢	
1941	2.43078¢		2.43078¢	
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16
1939	2.35367¢	Jan. 3	2.26689¢	May 16
1938	2.58414¢	Jan. 4	2.27207¢	Oct. 18
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10
1935	2.07642¢	Oct. 1	2.06492¢	Jan. 8
1934	2.15367¢	Apr. 24	1.95757¢	Jan. 2
1933	1.95578¢	Oct. 3	1.75836¢	May 2
1932	1.89196¢	July 5	1.83901¢	Mar. 1
1931	1.99626¢	Jan. 13	1.86586¢	Dec. 29
1930	2.25488¢	Jan. 7	1.97319¢	Dec. 9
1929	2.31773¢	May 28	2.26498¢	Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

HIGH		LOW	
$33.15	Mar. 11	$30.14	Jan. 7
30.14	Dec. 10	25.37	Jan. 1
* 25.37	Oct. 23	23.61	Jan. 2
$23.61		$23.61	
23.61		23.61	
23.61		23.61	
$23.61	Mar. 20	$23.45	Jan. 2
23.45	Dec. 23	22.61	Jan. 2
22.61	Sept. 19	20.61	Sept. 12
23.25	June 21	19.61	July 6
23.25	Mar. 9	20.25	Feb. 16
19.74	Nov. 24	18.73	Aug. 11
18.84	Nov. 5	17.83	May 14
17.90	May 1	16.90	Jan. 27
16.90	Dec. 5	13.56	Jan. 3
14.81	Jan. 5	13.56	Dec. 6
15.90	Jan. 6	14.79	Dec. 15
18.21	Jan. 7	15.90	Dec. 16
18.71	May 14	18.21	Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH		LOW	
$38.75	Mar. 11	$31.00	Jan. 7
31.17	Dec. 24	19.17	Jan. 1
19.17	Jan. 2	18.92	May 22
19.17	Jan. 11	15.76	Oct. 24
$19.17		$19.17	
19.17		19.17	
$22.00	Jan. 7	$19.17	Apr. 10
21.83	Dec. 30	16.04	Apr. 9
22.50	Oct. 3	14.08	May 16
15.00	Nov. 22	11.00	June 7
21.92	Mar. 30	12.67	June 9
17.75	Dec. 21	12.67	June 8
13.42	Dec. 10	10.33	Apr. 29
13.00	Mar. 13	9.50	Sept. 25
12.25	Aug. 8	6.75	Jan. 3
8.50	Jan. 12	6.43	July 5
11.33	Jan. 6	8.50	Dec. 29
15.00	Feb. 18	11.25	Dec. 9
17.58	Jan. 29	14.08	Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Cost of machine frame reduced 50% by change to welded design

BY LOUIS FAULB, PRESIDENT
KLEEN-KUT MANUFACTURING COMPANY
CLEVELAND, OHIO

Production cost of the frame of the Kleen-Kut meat saw manufactured by our company has been reduced more than 50% by redesigning it for fabrication by arc welding. The former design and the latest welded design are shown in Fig. 1.

The new design has reduced machining operations 60%, has made the machine six times as rigid, cut its weight from 550 to 350 pounds, and has doubled the production output of the same floor area.

The changeover to all-welded design was an evolutionary process over an 18-month period.

We started with the table frame shown in Fig. 3, and the cost reduction encouraged us to redesign the whole machine. Since our original all-welded design, we have made 40 improvements. If we had used conventional fabricating methods, 40 modifications or complete changes in patterns would have been necessary. Open views of the original welded design and the latest welded design are shown in Fig. 2.

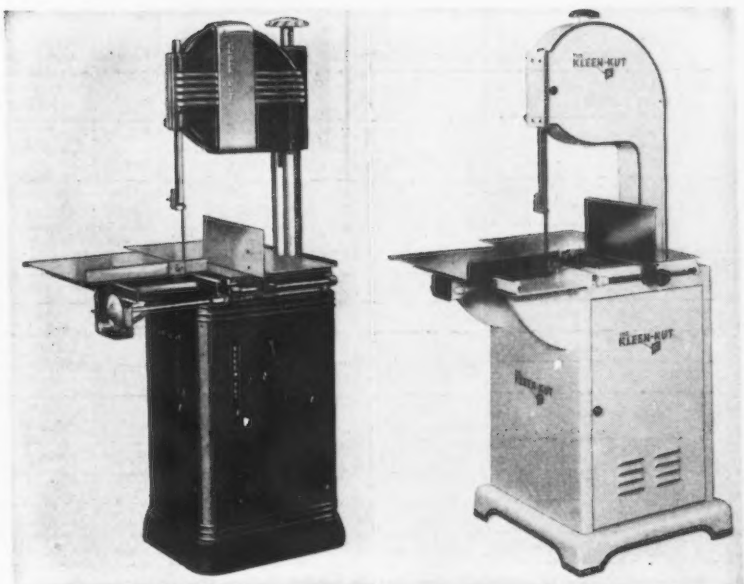


Fig. 1. Saw of former conventional design (left) and all-welded design (right).

IMPROVES THE PRODUCT

Welded design has increased the saw's overall rigidity and strength. The top pulley support, subject to considerable stresses, was stiffened by simply welding a 32-inch length of angle vertically inside the housing. Rigidity was further aided by widening the main frame to the full length of the base and redesigning the door.

Adjusting the saw blade tension in the former model required moving the entire head of the unit up or down, which took too much time. In the new design this adjustment is made by simply turning a rod. To incorporate this feature in the former design would have meant an excessive amount of machining.

INTERMITTENT WELDS USED

The new saw frame is made largely of formed plates, reinforced at strategic stress points with gussets and cross-braces. A minimum of material and welding is used, most parts being fused with intermittent welds like those in the table frame (Fig. 3). This type of welding obtains proper strength, avoids distortion and speeds production.

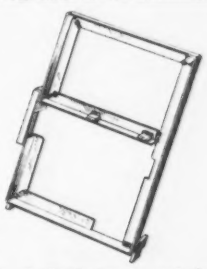


Fig. 3. Table frame, made from angles. This is the first part that was changed to welded design.

The table frame is constructed of 1½-inch angles with ½-inch bearing brace. The machine base consists of four ¼-inch plates joined by fillet welds in open corner joints. The main stand is 3/16-inch-thick steel sheet with inside fillet joints. Bearing and pin bosses are solid welded into the structure. Hinged covers are 14 gauge steel sheet.

Wherever possible, welding is done on the inside of the joint to give a smooth exterior appearance. Because materials are light-weight, all parts can be easily handled for bench-welding.

The reduction in machining operations has enabled us to double our production within the same floor area. Materials-procurement has also been simplified. Previously we ordered parts from seven outside firms; now we make them all in our own plant with simple, low-cost production facilities.

In approaching redesigning problems, our engineers have been aided by the Studies in Machine Design issued periodically by The Lincoln Electric Company. These are available free to engineers and designers who write The Lincoln Electric Company, Dept. 143, Cleveland 1, Ohio.

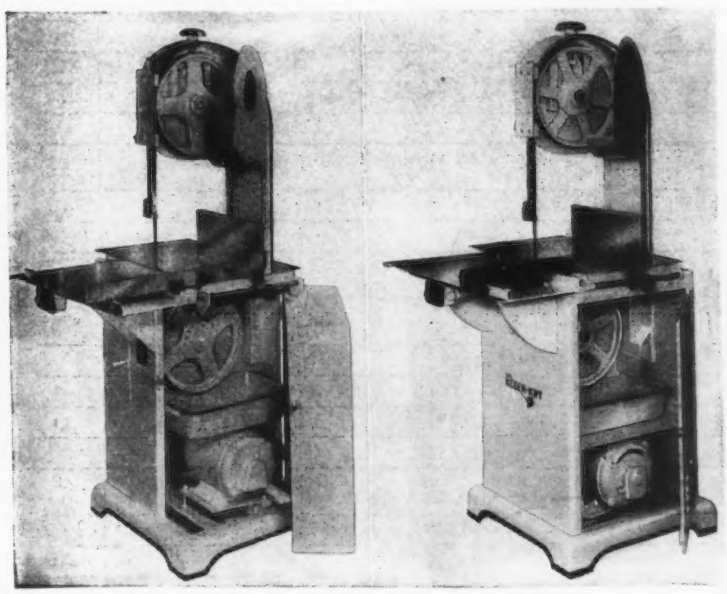


Fig. 2. Original welded design (left) and latest welded design (right) with covers open to show interiors.

Advertisement)

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25c above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) This base price for annealed, bright finish wire, commercial spring wire. (11) Boxed. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only: Includes 3 pct freight tax. (14) Delivered Kaiser Co. prices; includes 3 pct freight tax. (15) 0.035 to 0.075 in. thick by ¾ to 3⅛ in. wide. (16) Some producers are charging 2.75c.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS															
Carbon, rerolling	($35.00 f. o. b. mill)[15]														
Carbon, forging	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00	$40.00								
Alloy	$52.00	$52.00				$52.00	(Bethlehem, Massillon, Canton, Coatesville=$52.00)								
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	$42.00	$42.00	$42.00	$42.00	$42.00	$42.00	(Provo=$53.20) $42.00	$42.00					$45.00		
Carbon, forging billets	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	(Provo=$61.20, Duluth=$52.00[13]) $50.00						$53.00		
Alloy	$61.00	$61.00				$61.00	(Bethlehem, Massillon, Canton=$61.00)						$64.00		
SHEET BARS							$50								
PIPE SKELP	2.35¢	2.35¢					2.35¢	2.35¢	(Coatesville=2.35¢)						
WIRE RODS	2.55¢	2.55¢		2.55¢	2.55¢	(Worcester=2.65¢)						3.27¢[13]			
SHEETS															
Hot-rolled	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.50¢	2.875¢	2.50¢			2.65¢	2.79¢	2.70¢
Cold-rolled [1]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	3.20¢		3.30¢				3.35¢	3.61¢	3.58¢
Galvanized (10 gage)	3.55¢	3.55¢	3.55¢		3.55¢		3.55¢	3.55¢	3.65¢					3.84¢	3.75¢
Enameling (12 gage)	3.55¢	3.55¢	3.55¢	3.55¢			3.55¢		3.65¢				3.70¢	3.95¢	3.93¢
Long ternes [2] (10 gage)	3.55¢	3.55¢	3.55¢											3.95¢	3.91¢
STRIP															
Hot-rolled [3]	2.50¢	2.50¢	2.50¢	2.50¢[15]	2.50¢		2.50¢						2.65¢	2.93¢	2.88¢
Cold-rolled [4]	3.20¢	3.30¢		3.20¢			3.20¢			(Worcester=3.40¢)			3.35¢	3.61¢	3.58¢
Cooperage stock	2.80¢	2.80¢			2.80¢		2.80¢							3.09¢	
TINPLATE															
Standard cokes, base box	$5.75	$5.75	$5.75		$5.85			$5.85	$5.85		(Warren, Ohio=$5.75)		$6.157	$6.062[11]	
Electro, box (0.25 lb.)	Deduct 90¢ from standard coke base box price.														
Electro, box (0.50 lb.)	Deduct 70¢ from standard coke base box price.														
Electro, box (0.75 lb.)	Deduct 50¢ from standard coke base box price.														
BLACKPLATE															
29 gage [5]	3.60¢	3.60¢	3.60¢		3.70¢			3.70¢	3.70¢		(Warren, Ohio=$5.75)		3.99¢	3.90¢	
TERNES, MFG.															
Special coated, base box	Deduct 85¢ from standard coke base box price.														
BARS															
Carbon steel	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢					3.285¢	2.75¢	3.01¢	2.98¢
Rail steel [6, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢									
Reinforcing (billet) [7]	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢	2.45¢				2.985¢	2.60¢	2.74¢	2.65¢
Reinforcing (rail) [7, 16]	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢	2.60¢						2.75¢		
Cold-finished [8]	3.20¢	3.20¢	3.20¢	3.20¢		3.20¢	(Detroit=3.25¢)							3.61¢	3.58¢
Alloy, hot-rolled	3.05¢	3.05¢				3.05¢	3.05¢	(Bethlehem, Massillon, Canton=3.05¢)					3.20¢		3.19¢
Alloy, cold-drawn	3.80¢	3.80¢	3.80¢	3.80¢		3.80¢							3.95¢		
PLATE								(Coatesville, Claymont=2.80¢, Geneva, Utah=2.80¢)							
Carbon steel [12]	2.65¢	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢	2.65¢				3.46¢[14]		2.87¢	2.85¢
Floor plates	3.90¢	3.90¢												4.30¢	4.28¢
Alloy	3.79¢	3.79¢			(Coatesville=4.10¢)									4.01¢	3.895¢
SHAPES															
Structural	2.50¢	2.50¢	2.50¢		2.50¢	2.50¢	(Geneva, Utah=2.65¢) (Bethlehem=2.50¢)					3.41¢[14]		2.70¢	2.64¢
SPRING STEEL, C-R															
0.26 to 0.40 carbon	3.20¢			3.20¢			(Worcester=3.40¢)								
0.41 to 0.60 carbon	4.70¢			4.70¢			(Worcester=4.90¢)								
0.61 to 0.80 carbon	5.30¢			5.30¢			(Worcester=5.50¢)								
0.81 to 1.00 carbon	6.80¢			6.80¢			(Worcester=7.00¢)								
Over 1.00 carbon	9.10¢			9.10¢			(Worcester=9.30¢)								
MANUFACTURERS' WIRE [9]															
Bright [10]	3.30¢	3.30¢		3.30¢	3.30¢		(Worcester=3.40¢, Duluth=3.35¢)					5.63¢[13]		3.71¢	3.68¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.25¢	4.25¢		4.25¢		(Worcester=4.35¢, Duluth=4.50¢)				(Trenton=4.50¢)		5.24¢[13]		4.66¢	4.345¢
PILING															
Steel sheet	3.00¢	3.00¢				3.00¢								3.41¢	3.36¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation		Subject to negotiation			
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation		Subject to negotiation			
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.50	28.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.50	28.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi	27.50	28.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt.	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J. Phila., Ft. Wayne	27.50	28.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	32.48	30.30	23.80	24.34	34.62	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, P'gh, Chi, Canton, (4 to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)*

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Field grade	4.20¢
Armature	4.50¢
Electrical	5.00¢
Motor	5.70¢
Dynamo	6.45¢
Transformer 72	6.95¢
Transformer 65	7.65¢
Transformer 58	8.35¢
Transformer 52	9.15¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.50
Angle splice bars, 100 lb	3.00
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$2.85
Light rails (from rail steel), f.o.b. Williamsport, Pa.	2.95

	Base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.80¢
Tie plates, Pacific Coast	2.95¢
Track bolts	6.50¢
Track bolts, heat treated, to rail roads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, add 25¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$6.75	$13.50

CLAD STEEL

Base prices, cents per pound

Stainless-clad	*Plate*	*Sheet*
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	24.00*	22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	29.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

*Includes annealing and pickling.

MERCHANT WIRE PRODUCTS

To the dealer f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per keg	*Delivered San Francisco*
Standard, galvanized and coated nails	$3.75†	$4.83
Cut nails, carloads, Pittsburgh base	5.30	....

†10¢ additional at Cleveland, 30¢ at Worcester.

	Base per 100 lb	
Annealed fence wire	$3.95‡	$4.96
Annealed galv. fence wire	4.40‡	5.41

‡10¢ additional at Worcester.

To the dealer f.o.b. Pittsburgh, Chicago, Birmingham

	Base column	
Woven wire fence*	84	107
Fence posts, carloads	82††	...
Single loop bale ties	86	110
Galvanized barbed wire**	94	114
Twisted barbless wire	94	...

* 15½ gage and heavier. ** On 80-rod spools in carload quantities. †† Pittsburgh; Duluth 90.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	Y-50	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill	Great Lakes Steel
Plates	4.10	4.10	4.10	4.10	4.10	4.10	4.10	4.10	....	4.10
Sheets										
Hot-rolled	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	4.75	4.75	4.75	....	4.75	4.75	4.75	4.75	5.225*	4.55
Galvanized	....	5.40	....	....	....	5.40	....	....	....	....
Strip										
Hot-rolled	3.85	3.85	3.85	....	3.85	3.85	3.85	3.85	....	3.75
Cold-rolled	....	....	4.75	....	....	4.75	4.75	4.75	5.00*	4.55†
Shapes	....	3.85	....	....	3.85	3.85	3.85	3.85	....	....
Beams	....	3.85	....	....	....	3.85	....	....	....	....
Bars										
Hot-rolled	4.00	4.00	4.00	....	....	4.00	4.00	4.00	....	4.00
Cold-rolled	....	....	....	....	....	....	....	4.60	....	....
Bar shapes	....	4.00	....	....	4.00	4.00	4.00	4.00	....	....

* 21 gage and lighter. † Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts. F.ob. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only

Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	*Black*	*Galv.*
⅛-in.	55½	41
¼-in.	58½	45
1 to 3-in.	60½	47½
Wrought Iron, buttweld		
⅛-in.	2	+20
¼-in.	11½	+10
1 and 1¼-in.	17	+ 2
1½-in.	22½	1½
2-in.	23	2
Steel, lapweld		
2-in.	53	39½
2½ and 3-in.	56	42½
3½ to 6-in.	58	44½
Steel, seamless		
2-in.	52	38½
2½ and 3-in.	55	41½
3½ to 6-in.	57	43½
Wrought Iron, lapweld		
2-in.	14½	+ 5½
2½ to 3½-in.	17	+ 1½
4-in.	21	4
4½ to 8-in.	19	2½

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	54½	41½
¼-in.	58½	45½
1 to 3-in.	60	48
Wrought Iron, buttweld		
⅛-in.	6½	+14
¼-in.	12½	+ 8
1 to 2-in.	22	2
Steel, lapweld		
2-in.	52	39½
2½ and 3-in.	56	43½
3½ to 6-in.	59½	47
Steel, seamless		
2-in.	51	38½
2½ and 3-in.	55	42½
3½ to 6-in.	58½	46
Wrought Iron, lapweld		
2-in.	17½	+ 2
2½ to 4-in.	26	8½
4½ to 6-in.	22	4

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

O.D. in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$15.29	$18.17	$15.00	$17.95
2½	12	20.57	24.43	20.11	24.07
3	12	22.87	27.18	22.26	26.68
3½	11	28.86	34.30	28.06	33.64
4	10	35.82	42.55	34.78	41.68

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in., del'd Chicago	$75.56
6-in. to 24-in. del'd New York	73.80
6-in. to 24-in., Birmingham	65.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less	89.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots

Percent Off List

½ in. & smaller x 6 in. & shorter	55
9/16 & ⅝ in. x 6 in. & shorter	52
¾ in. x 6 in. & shorter	49
1⅛ in. and larger, all lengths	48
Lag, all diam over 6 in. long	48
Lag, all diam x 6 in. & shorter	50
Plow bolts	57

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	48
9/16 to 1 in. inclusive	47
1⅛ to 1½ in. inclusive	45
1⅝ in. and larger	44

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less case lots		
7/16 in. and smaller	..	51
½ in. and smaller	48	..
½ in. through 1 in.	..	48
9/16 in. through 1 in.	47	..
1⅛ in. through 1½ in.	45	46
1⅝ in. and larger	44	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Consumer

Packages, nuts separate	60 and 10
In bulk	74

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets

(⅛ in. and larger)

Base per 100 Lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$5.25
F.o.b. Lebanon, Pa.	5.40

Small Rivets

(7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws

(In packages)

Percent Off List — Consumer

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	56
Set screws, cup and oval points	61
Milled studs	33
Flat head cap screws, listed sizes	21
Fillister head cap, listed sizes	40

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer	$5.95
Old range, non-bessemer	5.80
Mesabi, bessemer	5.70
Mesabi, non-bessemer	5.55
High phosphorus	5.55

Prices quoted retroactive to Jan. 1, 1947.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh	23¢ to 27¢
Copper, electrolytic, 100 and 325 mesh	30¢ to 31½¢
Copper, reduced, 150 and 200 mesh	29¢ to 30½¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	5¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	66¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe	25¢ to 31¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to $1.75
Aluminum, 100, 200 mesh, carlots	23¢ to 26¢
Antimony, 100 mesh	36.05¢
Cadmium, 100 mesh	$2.00
Chromium, 100 mesh and finer	$1.025
Lead, 100, 200 & 300 mesh	18.50¢ to 23.50¢
Manganese, minus 325 mesh and coarser	33¢
Nickel, 150 mesh	51½¢
Silicon, 100 mesh	13.15¢
Solder powder, 100 mesh	8½¢ plus metal
Tin, 100 mesh	76.75¢
Tungsten metal powder, 98%-99%, any quantity, per lb	$2.80
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb	$2.65
Under 100 lb	$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$8.75 to $9.25
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	10.00 to 10.50
Foundry, Byproduct	
Chicago, del'd	$16.10
Chicago, f.o.b.	15.10
New England, del'd	16.04
Seaboard, Kearney, N. J., f.o.b.	15.35
Philadelphia, del'd	15.46
Buffalo, del'd	16.14
Ashland, Ohio, f.o.b.	13.35
Painesville, Ohio, f.o.b.	14.60
Erie, del'd	15.75
Cleveland, del'd	15.90
Cincinnati, del'd	15.39
St. Louis, del'd	15.85
Birmingham, del'd	12.35

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Carloads, Per 1000

First quality, Ohio	$57.00
First quality, Pa., Md., Ky., Mo.	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	51.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Plymouth Meeting, Chester	$59.00

Magnesite Brick

Standard, Balt. and Chester	$81.00
Chemically bonded, Baltimore	70.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	24.00
in sacks	28.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.65

Midwest, add 10¢; Mo. Valley, add 20¢

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		Plates 3/16 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled (10 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
**Philadelphia	$4.24	$5.33	$5.29a	$4.43	....	$4.40	$4.22	$4.48	$5.38	$8.37	$8.37	$9.88	$9.88
New York	4.42	5.72[1]	5.47	4.62	5.25	4.72	4.37	4.62	5.42	8.42	8.42	9.92	9.92
Boston	....	6.218	....	....	5.156	....	....	....	5.468	....	....	....	....
Baltimore	4.09	....	5.14	....	....	4.39	4.34	4.45	5.35	....	....	....	....
Norfolk	4.35	....	....	....	....	4.50	4.50	4.75	5.50	....	....	....	....
Chicago	4.00	....	....	4.00	....	4.30	4.05	4.05	4.95	8.10	8.10	....	9.35
Milwaukee	4.199	5.349	5.249	4.199	....	4.499	4.249	4.249	5.149	8.399	8.399	9.849	9.649
Cleveland	....	....	....	4.188	....	4.30†	4.311	4.05	4.95	8.358	8.358	9.35	9.35
Buffalo	4.00	5.15	5.35	4.302	6.002	4.65	4.05	4.05	4.95	8.10	8.10	9.35	9.35
Detroit	4.14	5.29	5.42	4.34	....	4.59	4.42	4.19	5.00	....	....	....	....
Cincinnati	4.116	4.716	5.166	....	....	4.803	....	....	5.252	....	....	....	....
St. Louis	4.199	5.349	5.424	4.199	....	4.499	4.249	4.249	5.324	8.574	8.574	9.824	9.824
Pittsburgh	3.725	4.60[1]	....	4.00	....	3.95	3.80	4.05	4.95	8.10	8.10	9.35	9.35
St. Paul	3.384[7]	5.534[1]	5.434[2]	4.404[7]	....	4.884[7]	4.434[7]	4.434[7]	5.726[6]	....	10.084[6]	....	11.726[5]
Duluth	....	....	....	....	....	....	....	....	....	....	....	....	....
Omaha	4.868	6.618[1]	5.918	4.862	....	5.168	4.918	4.918	5.818	....	....	....	....
Indianapolis	....	....	....	....	....	....	....	....	....	....	....	....	....
Birmingham	3.85	....	5.20	4.10	....	4.30	4.05	4.05	5.83	....	....	....	....
Memphis	....	....	....	....	....	....	....	....	....	....	....	....	....
New Orleans	*4.46[11]	5.77[1]	....	....	....	4.83[11]	*4.68[11]	*4.78[11]	6.14	....	....	....	....
Los Angeles	....	....	....	....	....	....	....	....	....	....	....	....	....
San Francisco	4.90[8]	6.30[9]	6.45	5.20[8]	....	5.00[8]	4.90[8]	4.70[8]	7.00[10]	....	....	....	....
Seattle	5.00	7.80	6.05	....	....	5.25	4.95	4.90	6.75	....	....	....	....
Portland	5.00[3]	....	6.25	....	....	5.40	5.10	5.10	....	....	....	....	....
Salt Lake City	5.85	....	7.10	....	....	5.55	5.85	5.95	7.00	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 and over.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 10,000 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999; (8) 400 lb and over; (9) 450 to 1499; (10) 500 to 999; (11) 400 to 3999.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

* Add 46¢ for sizes not rolled in Birmingham.

** City of Philadelphia area only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area after deducting 34¢ per 100 lb (L.c.l. Sparrows Point to Philadelphia).

† Up to ¾ in. thick and 90 in. wide.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	34.00	34.50	35.00	35.50	....	Boston	Everett	$0.50 Arb.	29.50	30.00	30.50	31.00	....
Birdsboro	34.00	34.50	35.00	35.50	39.00	Boston	Birdsboro-Steelton	4.82	....	....	....	....	43.82
Birmingham	29.38	29.88	....	....	....	Brooklyn	Bethlehem	3.00	37.00	37.50	38.00	38.50	....
Buffalo	32.50	33.00	33.50	....	....	Brooklyn	Birdsboro	3.50	....	....	....	....	42.50
Canton	32.50	33.00	33.50	....	....	Cincinnati	Birmingham	4.87	34.25	34.75	....	....	....
Chicago	32.50	33.00	33.50	34.00	....	Jersey City	Bethlehem	1.84	35.84	36.34	36.84	37.34	....
Cleveland	32.50	33.00	33.50	....	....	Jersey City	Birdsboro	2.33	....	....	....	....	41.33
Duluth	33.00	33.50	34.00	34.50	....	Los Angeles	Provo	5.94	35.94	36.44	....	....	....
Erie	32.50	33.00	33.50	34.00	....	Mansfield	Cleveland-Toledo	2.33	34.83	35.33	35.83	36.33	....
Everett	29.00	29.50	30.00	30.50	....	Philadelphia	Swedeland	1.01	36.01	36.51	37.01	37.51	....
Granite City	30.00	30.50	30.50	31.00	....	Philadelphia	Birdsboro	1.49	....	....	....	....	40.49
Massillon	32.50	33.00	33.50	....	....	San Francisco	Provo	5.94	35.94	36.44	....	....	....
Neville Island	33.00	33.50	33.50	34.00	....	Seattle	Provo	5.94	35.94	36.44	....	....	....
Provo	30.00	30.50	....	....	....	St. Louis	Granite City	0.75 Arb.	30.75	31.25	31.25	31.75	....
Sharpsville	33.00	33.50	33.50	34.00	....								
Steelton	34.00	....	....	....	39.00								
Swedeland	37.50	35.50	36.00	36.50	....								
Toledo	32.50	33.00	33.50	34.00	....								
Troy, N. Y.	34.00	34.50	35.00	35.50	39.00								
Youngstown[1]	32.50	33.00	33.00	33.50	....								

Received too late for inclusion above was St. Louis advance of $2.50 on basic and $3 on foundry and malleable grades.

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base price for low phosphorous $40.50 per gross ton, f.o.b. Lyles, Tenn. Delivered to Chicago, $45.99. High phosphorous charcoal pig iron is not being produced.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$40.50; f.o.b. Buffalo—$41.75. Add $1.00 per ton for each **additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.**

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50

$1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	6.40	6.65	7.20
Ton lots	7.30	7.90	9.80
Less ton lots	7.70	8.30	10.20

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$39.00	$40.00
F.o.b. Pittsburgh		44.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C, 7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.45
Ton lots	7.40
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	6.15
Ton lots	7.05
Less ton lots	7.45

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, $56.00 f.o.b. Keokuk, Iowa; $52.75 f.o.b. Jackson, Ohio; $54.00 f.o.b. Niagara Falls. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	14.65	16.90	18.65
97% Si, 1% Fe	15.05	17.30	19.05

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si. 1 lb briquets.

	Eastern	Central	Western
Carload, bulk	3.85	4.10	4.30
Ton lots	4.75	5.35	5.65
Less ton lots	5.15	5.75	6.05

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	11.65	...	...
50% Si	7.45	7.95	8.15
75% Si	9.25	9.55	10.30
80-90% Si	10.45	10.75	11.50
90-95% Si	12.05	12.35	13.05

Ferrochrome (65-72% *Cr, 2% max. Si*)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
65-69% Cr, 4-9% C	15.60	16.00	16.15
62-66% Cr. 4-6% C. 6-9% Si.	16.60	17.00	17.15

Briquets — contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	9.85	10.10	10.20
Ton lots	10.75	11.65	12.25
Less ton lots	11.15	12.05	12.65

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chrominum contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	16.70	17.10	17.25
Ton lots	17.90	19.20	20.00
Less ton lots	18.60	19.90	20.70

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed, 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60.65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.60	$2.35	$2.95
Less ton lots	1.95	2.70	3.75

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	13.50	14.60	16.55
Less ton lots	14.25	15.35	17.30

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	13.25	14.35	16.30
Less ton lots	14.00	15.10	17.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed... $2.08

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.70
Crucible	$2.80
High speed steel (Primos)	$2.90

Vanadium pentoxide, 88-92% V_2O_5 technical grade, contract basis, per pound contained V_2O_5 $1.10

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

Ton lots	$2.50
Les ton lots	$2.55

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo ..... 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo..... 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo..... 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo..... 80¢

Ferrotitanium, 40-45%, 0.10%C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23
Less ton lots $1.25

Ferrotitanium, 20-25%, 0.10%C max., ton lots, per pound contained Ti $1.35
Less ton lots $1.40

High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton..$142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. (Siglo) Tenn., $3 unitage per gross ton $65.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.
Carload, lots ..... 14.50¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy
Carload, bulk ..... 4.85¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload ..... 6.25¢
Ton lots ..... 6.75¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Car lots ..... 8.50¢
Ton lots ..... 9.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	$1.30	$1.3075	$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$2.10	$2.1125	$2.1445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.
Carload lots ..... 35¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	87.5¢
No. 6	60¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N.Y., freight allowed. Ti 15—17%, B 0.90—1.15%, Si 2.5—3.0%, Al 1.0—2.0%.
Ton lots, per pound ..... 8.0¢

Noneconomic Wage Contract Talks Vary

Seniority and Safety Are Main Subjects Being Covered On Regional Area Levels

Pittsburgh

• • • **While the economic** issues of the new CIO-USWA contract with the U. S. Steel Corp. are being discussed, the noneconomic issues being discussed on regional and local levels with other steel producers seem to vary according to what the local union officials believe are most important in the individual plants. However, factors that come up most frequently appear to be the closed shop, union seniority and safety.

The steel companies have, in their counter-proposals, more or less ruled out the closed shop, in line with the U. S. Steel counter-proposals of several weeks ago. Consequently, any definite developments on this particular demand will have to await the outcome of negotiations between the union and U. S. Steel.

As to seniority and safety, which in some phases are inextricably bound together, there appears to be a rather definite stand taken by the steel companies. The steel companies that have been discussing the seniority rule for promotion of employees are definitely against such a clause in the contract. Actually, the present contract specifies that seniority shall rule in promotions, but management must be in accord with the promotion.

Management feels that it should have some right to place and displace workers in order to increase the efficiency and effectiveness of an operation. Further, observers point out that on the basis of straight seniority, the individual who possesses certain capabilities that are desirable from the management standpoint could not be properly utilized. For example, there may be the desire on the part of management to take specific capable workers and train them as foremen, supervisors, or even sales or metallurgical specialists. To do this would require on-the-job training. Under the straight seniority rule, such training would be impossible, since it would displace an older man on a job.

Further, when a job is open, it is not always practicable that the oldest man should have it. Actually, a man with less seniority but greater capabilities should have the job, but a seniority rule in the contract would not permit the faster upgrading. Observers point out, the hiring of the oldest employee might actually cause a safety hazard to both the employee and his fellow workers if he is physically unfit for such a job but gets it on seniority alone. This actually occurred recently in one of the midwest steel plants and the result was that even though the company was willing to go along on straight seniority rule, it was evident the senior job applicant could not take the job.

On the straight safety factors of the coming union contract, the CIO-USWA has been insisting upon representation on a joint safety committee to regulate and determine safety policy, expenditures and practices. However, according to one observer who has sat in on the meetings, the union will not sanction disciplinary action on workers who break the safety rules. Further, the CIO wants its own safety inspectors in each department. This, according to company officials, amounts to nothing more than a greater number of shop stewards who spend time away from their specific jobs on union matters.

Stevens to Conduct Government Research In Powder Metallurgy

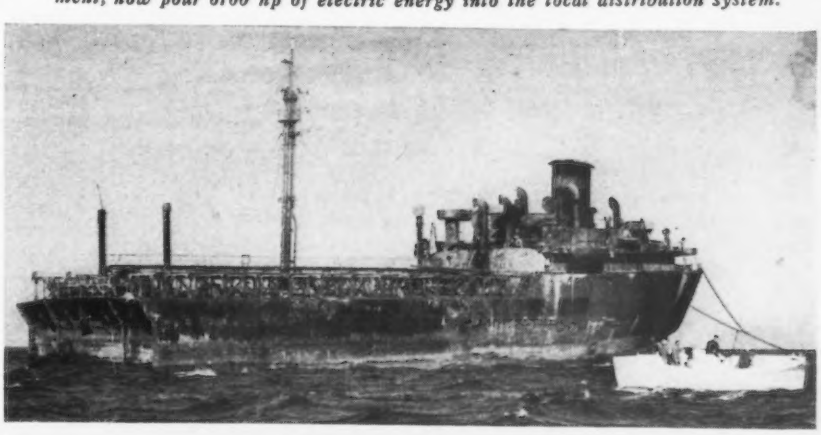
Hoboken, N. J.

• • • **A research project** to improve metal powder industrial techniques is being sponsored by the Industrial Research and Development Div. of the Commerce Department's Office of Technical Services, and Stevens Institute of Technology, Hoboken, N. J., will carry out the research under a 6-month contract for which an allotment of $22,500 has been authorized.

Stevens Institute will test iron powders furnished by domestic producers to determine the factors affecting physical properties most suitable for widespread industrial application of powder metallurgy. Particle size, sintering methods, chemical composition, density and other conditions influencing the utility of the powders will be studied. It is expected that the project will amplify the standard specifications of commercial iron powders for various uses.

Wartime experience in this country and Germany revealed that powder metallurgy techniques, if sufficiently developed, could be used more effectively than forging or casting for making many steel machined parts. Upon completion of the research Stevens Institute will make a full report of its findings which will be issued by OTS.

HALF A SHIP IS BETTER THAN NONE: *Salvaging the stern half of the S. S. Donbass III, former American built Russian tanker which has now been berthed at Eureka, Calif., to supply supplemental electrical power for the Pacific Gas and Electric Co. The tanker broke in two in the North Pacific and the other half went down, taking with it the master and 14 men of the crew. The General Electric engines, originally designed and installed as the ship propulsion equipment, now pour 6700 hp of electric energy into the local distribution system.*



DANLY

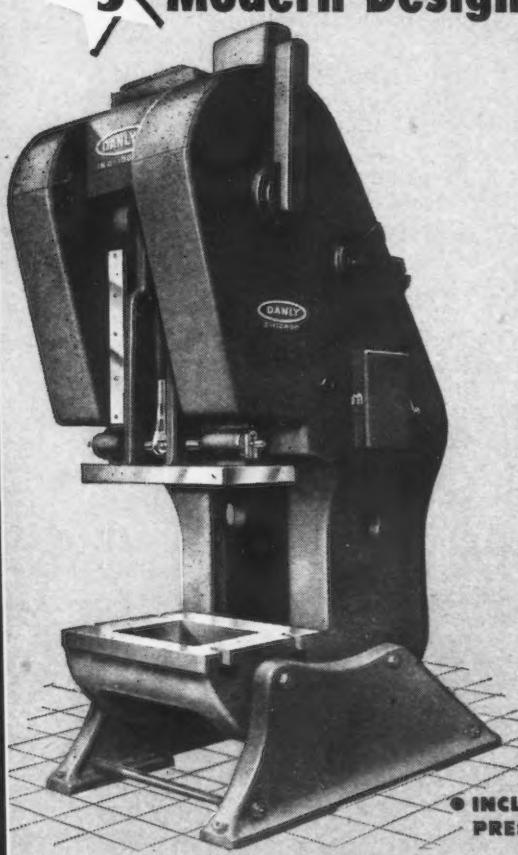
1 Rugged Construction

2 Mechanical Accuracy

3 Pressure Lubrication

4 Air-Friction Clutch

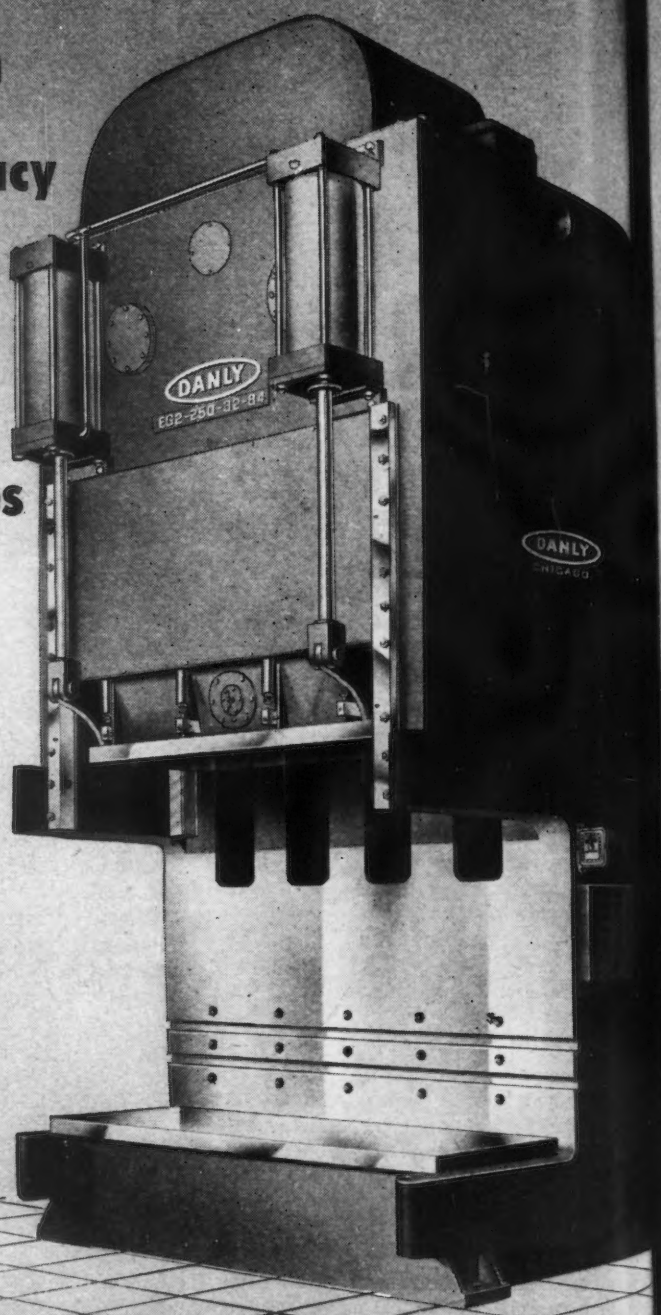
5 Modern Design Features



● INCLINABLE PRESS

This 100-ton, eccentric gear, Inclinable Press, has a unit frame of rugged one-piece all-steel construction. Extra long gibs and two suspension points—insure even pressure along the full length of the stroke, make for accurate alignment on large or progressive dies.

This press has an 8" stroke—operates 40 strokes per minute. Adjustment of slide—4" by hand. Bed area is 31" x 40"—designed to be equipped with air cushion if desired. Pivot point is so arranged that the center of the bed is not elevated when press is inclined. Distance floor to bed—33". Shut Height—19".

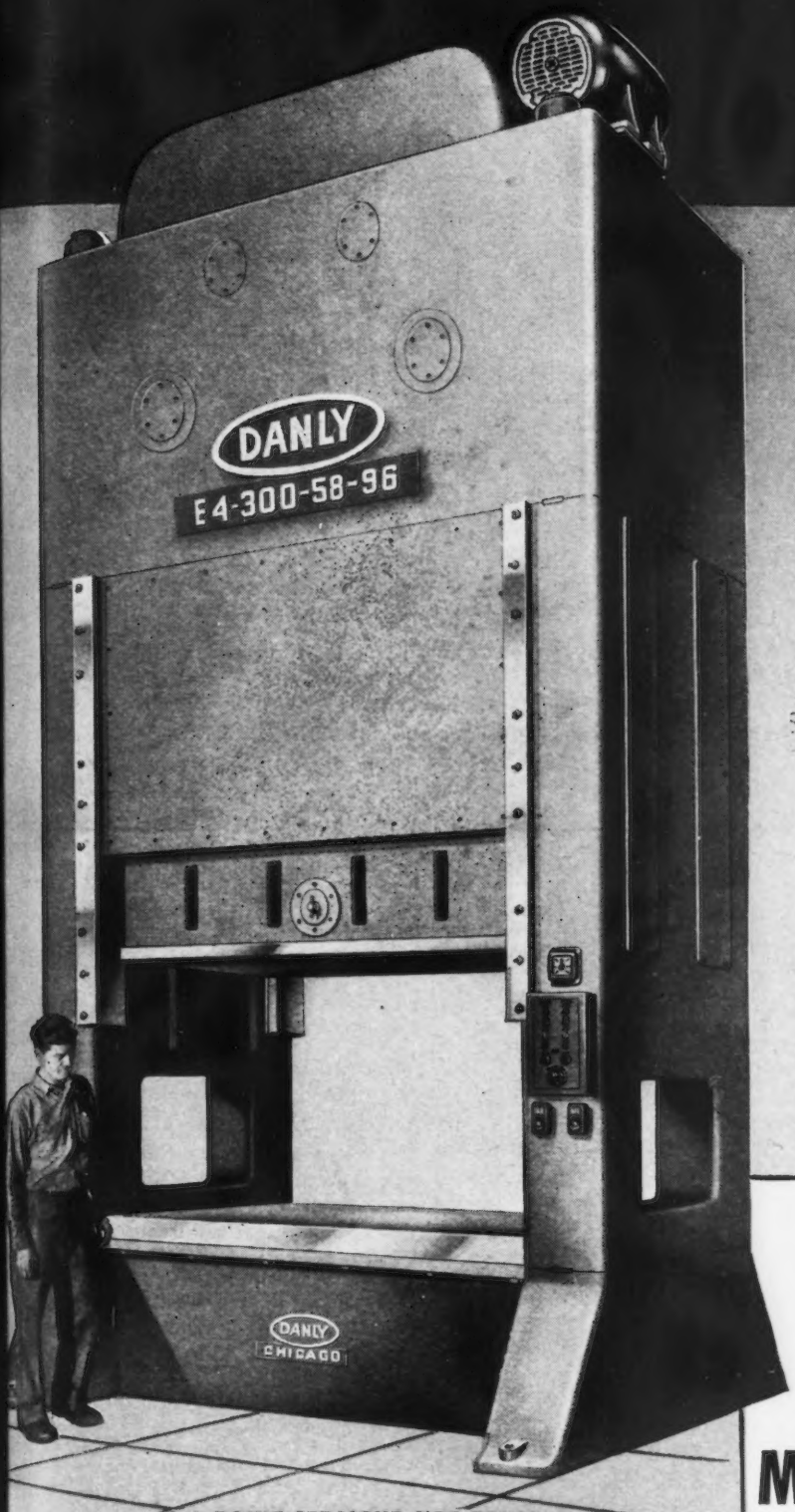


● GAP-FRAME PRESS

The 250-ton, 2-Point Eccentric Gear Gap-Frame Press, shown above is of all steel Danlyweld construction. Intermediate *continuous* structural members extend up through the back of the frame reducing deflection throughout the entire length of the bed. Gearing and driving members are completely enclosed within the frame.

This press has a 14" stroke—operates at 20 strokes per minute. Bed area is 32" x 84". Shut height—54".

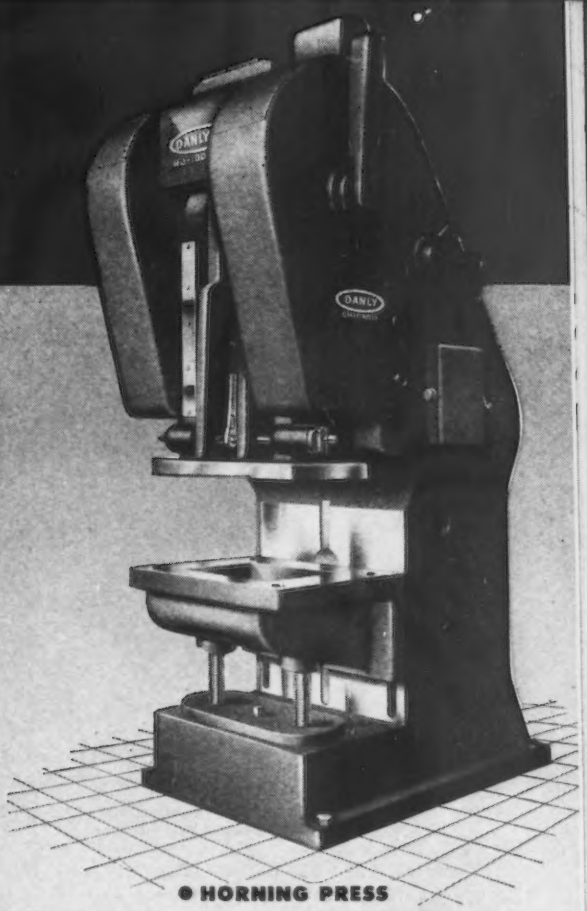
.THE PRESS for MODERN PRODUCTION..



● 4-POINT STRAIGHT-SIDE PRESS

Compact, enclosed construction keynotes the design of the 300-ton Straight-Side Press, *shown above*. Gears and driving members are completely enclosed within the frame.

This press has eccentrics cut on the four main gears and 4 Suspension Points—Extra Long Gibs. Bed area is 58" x 96". Stroke is 18"—Double geared to operate at 18 strokes per minute. Adjustments of Slide—12". Shut height—54". Air-Friction Clutch, Electric Stroke Indicator, and Push-Button Control—Motor Adjustment of Slide, are standard equipment on this model.



● HORNING PRESS

The 100-ton Eccentric Gear, Horning Press, *shown above*, has a one-piece all-steel frame. Extra-long gibs and 2 suspension points—unusual features in a press of this type and size, make for accurate alignment on large or progressive dies.

This press has an 8" stroke—operates at 40 strokes per minute. Adjustment of slide—4", by hand. Shut height with knee adjustment down, slide adjustment up—20"; adjustment of knee—10". Shut height with knee removed—39".

DANLY
MACHINE SPECIALTIES
INC.

●

2100 SOUTH 52nd AVENUE
CHICAGO 50, ILLINOIS

N.

Silicone News

DC SILICONES

DC Silicone Insulation saves space and weight in aircraft industry

PHOTO COURTESY WELLS AIRCRAFT PARTS CO.

When big transport planes land at 90 mph, the friction required to get the wheels turning at landing speed wears out the tires rapidly and puts a great strain on the landing struts. That's why so much time and money have been spent on various devices for pre-rotating aircraft wheels.

Most recent and promising is a Silicone insulated ring-type motor designed by Otto E. Dever of Los Angeles and built by Wells Aircraft Parts Co., also of Los Angeles, for flight testing on the Lockheed "Constitution."

The Dever Pre-rotation Motor weighs less than 14 pounds and is designed as an integral part of the wheel. The motors built for the Constitution deliver 9 hp in accelerating the wheels to a landing speed of 630 r.p.m. in two minutes. Since that speed must be maintained within 5% for just a few minutes, these motors work hard but briefly.

Probably Class "B" insulation would withstand such severe but intermittent service for a limited time. There would be little economy, however, in having to rewind the motors after a few landings. By specifying DC Silicone Insulation, Mr. Dever recognizes the difference between war and peacetime economies.

During the war, aircraft motors and generators were built to save space and weight at the expense of service life. That was good wartime economy but it is not sound commercial practice.

The introduction of Dow Corning Silicone Insulation makes it possible to reduce the size and weight of electric machines by about 50% and still secure long and reliable service, even under conditions of extreme humidity. More information about DC Silicone Insulation is given in leaflet No. S 3-5.

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FIRST IN SILICONES

Record Crowd Expected To Attend Openhearth Meeting April 21-23

New York

• • • **With openhearth steel** production at peacetime peak levels and with raw materials for steelmaking in one of the tightest postions in steel history, officials of the American Institute of Mining and Metallurgical Engineers expect a record attendance at the national openhearth steel committee and the coke oven, blast furnace and raw materials committee —thirtieth annual conference— to be held here Apr. 21, 22 and 23. The condensed programs are as follows:

Openhearth Program

Monday, Apr. 21

8:30 a.m. Registration, Third Floor Foyer.

10:00 a.m. Trip through Coke and Iron Plant of the American Rolling Mill Co., Hamilton, Ohio.

12:30 p.m. Luncheon at Manchester Hotel, Middletown, Ohio.

2:30 p.m. Trip through East Works Steel Plant of the American Rolling Mill Co., Middletown, Ohio.

Tuesday, Apr. 22

8:30 a.m. Registration, Third Floor Foyer.

9:30 a.m. Acid and Basic—General Session.
Announcements and reports; McKune Award paper.

10:30 a.m. Basic Session on Operations.
Raw materials, scrap, hot metal quality; use of oxygen in open hearth furnaces.

10:30 a.m. Acid Session.
Gas washing of liquid metal in the ladle; a direct reading spectrometer; question period, use of basic brick, pig iron substitutes.

2:00 p.m. Basic Session on Operations.
Flush hole maintenance; bottom maintenance; furnace maintenance; use of new mechanical equipment; furnace personnel training.

2:00 p.m. Cold Metal Operations and Basic Foundry Practice.
Pig iron substitutes in basic practice; recarburization of soft melts; deoxidation in basic steel foundries.

6:30 p.m. Reception.

7:00 p.m. Annual Fellowship Dinner.
Speaker: Mr. C. R. Hook, president, American Rolling Mill Co.

Wednesday, Apr. 23

8:30 a.m. Registration, Third Floor Foyer.

9:30 a.m. Metallurgy of the Open Hearth Process.
Oxygen content of liquid steel; deoxidation; slag control; ingot solidification; water cooling of killed open top ingots; present status of the observation corps.

9:30 a.m. Refractories and Masonry Session.
Performance of silica and basic brick; rammed basic doors; trends in bottom construction; checkers; mixer linings; transfer ladle and pouring pit refractories.

2:00 p.m. Quality Session.
Rate of pour v. steel surface quality; type of hot top v. ingot soundness; bath temperature measurements; effect of raw materials and melting variables on sulfur content; mold practice.

Coke Oven, Blast Furnace, Raw Materials Program

Monday, Apr. 21

8:30 a.m. Registration, Third Floor Foyer.

10:00 a.m. Trip through Coke and Iron Plant of the American Rolling Mill Co., Hamilton, Ohio.

12:30 p.m. Luncheon at Manchester Hotel, Middletown, Ohio.

2:30 p.m. Trip through East Works Steel Plant of the American Rolling Mill Co., Middletown, Ohio.

Tuesday, Apr. 22

8:30 a.m. Registration, Third Floor Foyer.

10:30 a.m. Production and Use of Oxygen for Blast Enrichment.

12:00 noon Luncheon Meeting.
Everyone attending the Coke Oven, Blast Furnace and Raw Materials sessions is invited to attend this luncheon and annual business meeting.

1:30 p.m. Coal Session.
Reserves and future of coking coals in U.S.; coal preparation and coke sizing.

6:30 p.m. Reception.

7:00 p.m. Fellowship Dinner.
Speaker: Mr. C. R. Hook, president, American Rolling Mill Co.

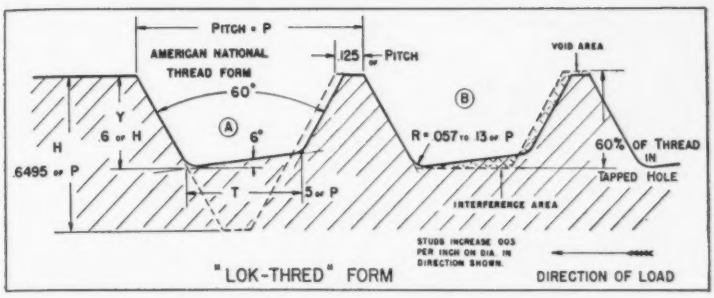
Wednesday, Apr. 23

8:30 a.m. Registration, Third Floor Foyer.

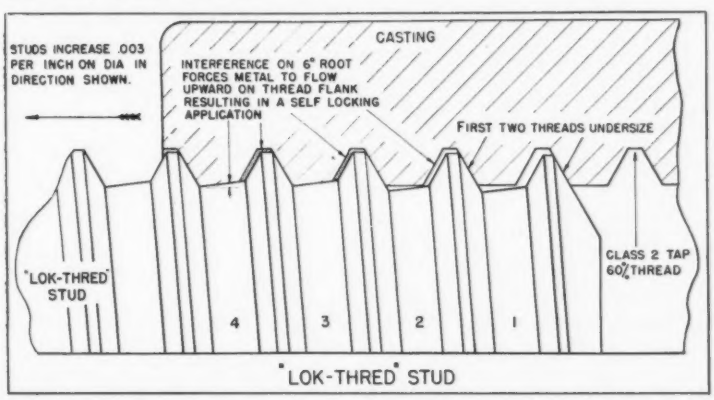
9:30 a.m. Design and High Pressure Operation.
Progress of blast furnace design; blast furnace operation under high blast pressure.

1:30 p.m. Metallurgy of the Blast Furnace Process.
Discussion of some questions on the interrelated processes going on in the blast furnace.

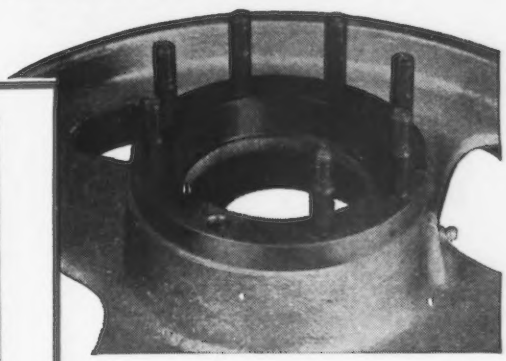
"LOK-THRED" STUDS BECOME *TIGHTER* IN SERVICE



The heavy black line illustrates the "LOK-THRED" form superimposed on the American National Thread form indicated by the dotted lines, position A picturing the comparison in the male thread of each. Position B diagrams the action that occurs as the male "LOK-THRED" enters the 60% American National Thread tapped hole. The metal from the crest of the female thread (shown as "interference area") is caused to flow along the helix angle of the male "LOK-THRED" completely filling the void between the flanks of the two mating threads (indicated as "void area"). This creates a positive seal and firmly anchors the stud.


STUDS INCREASE .003 PER INCH ON DIA IN DIRECTION SHOWN.
CASTING
INTERFERENCE ON 6° ROOT FORCES METAL TO FLOW UPWARD ON THREAD FLANK RESULTING IN A SELF LOCKING APPLICATION
FIRST TWO THREADS UNDERSIZE
"LOK-THRED" STUD
4
3
2
1
CLASS 2 TAP 60% THREAD
"LOK-THRED" STUD

This pictures in detail the sealing and locking action that occurs as the "LOK-THRED" Stud is driven into the tapped hole. The reforming of the crest of the female thread begins at or before the second thread and this will completely fill the voids starting with the third or fourth thread. The .003" or more thread taper of the "LOK-THRED" Studs increases the interference and supplements the flow of metal just described to produce an increasingly firm anchor as the stud is driven to the depth desired.



These diagrams show why "LOK-THRED" Studs lock more securely than American National Threads, and why they are chosen for such applications as this differential axle driving flange used by the Silent Hoist & Crane Company on their "Krane Kar".

Notice in the diagrams the 6° angle at the root of the "LOK-THRED" which carries the entire normal load under high compressive pre-stress. This avoids the chief weakness of standard interference fit, which tends to cause a bursting or splitting action by placing the metal of the receiving thread under shear.

10 ADVANTAGES OF "LOK-THRED" STUDS

1. Lock securely and become tighter in service.
2. Have much higher fatigue limits than studs with conventional threads.
3. Stronger in both tension and torsion than ordinary American National Threads.
4. Carry entire normal working load on 6° angle at root of thread under high compressive pre-stress.
5. Modified American National Threads permit use of standard tools.
6. Re-usable and on any re-application less than one-half additional turn brings torque back to its original installation value.
7. Do not require selective fits.
8. Do not gall when being driven nor fret in service.
9. Act as dowels and taper pins.
10. Seal positively and eliminate added bosses and blind tapping.

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Reports Cash Position Of UAW-CIO Reduced More Than $2 Million

Detroit

• • • **During the 12 months** ended May 1946, the UAW-CIO cash position was reduced more than $2 million according to a statement recently issued by George F. Addes, secretary-treasurer.

In his annual report to the UAW-CIO membership, Mr. Addes said: "From a strictly financial standpoint the report is the most discouraging we have submitted for some years. Expenditures exceeded income by nearly $2 million and the net worth of the union dropped from $2,689,353 as of May 31, 1945, to $715,375 as of May 31, 1946.

The largest portion of this drop took place during the last 6 months covered by the report, Mr. Addes said, the actual operating deficit for the period being $1,381,904.

As of August 1946 the report shows a UAW-CIO membership of 764,639; as of December 1945 the number of dues paying members was 539,575. The maximum number of members shown in the report covering 1943 through August 1946 was March 1944 when 1,236,580 members were reported.

The most obvious reason accounting for the union's financial difficulties was the tremendous drop in receipts, Mr. Addes said. Total income for the previous fiscal year exceeded $6½ million and dropped to less than $4 million during the 12 months covered by the report. The large number of members unemployed because of reconversion delays as well as the large number on strike were contributing factors to the decline, the union said.

Although the GM strike was settled in March, Mr. Addes disclosed, it was not until July that the International received any sizable amount of per capita tax under the voluntary check-off arrangement.

The union's strike fund shows a balance of $124,080 as of Nov. 1946, the report revealed. Since its conception and up to the end of November 1946 the total income paid into the strike fund account as a result of donations, assessment and per capita tax aggregated $1,950,267, the report showed. Disbursements against the fund totaled $1,826,186.

The report also shows that of the amount disbursed from the strike fund over a million dollars went toward the relief of GM workers. In recent months the total has been averaging $150,000 per month chiefly because of the J. I. Case and Allis-Chalmers strikes in Wisconsin.

In making his report, Mr. Addes warned the union members that labor's right to strike, backed up by a financial fund for the relief of workers, is the most powerful weapon belonging to organized workers.

Bulletin Reveals Data On Milling of Alabama Red Mountain Ores

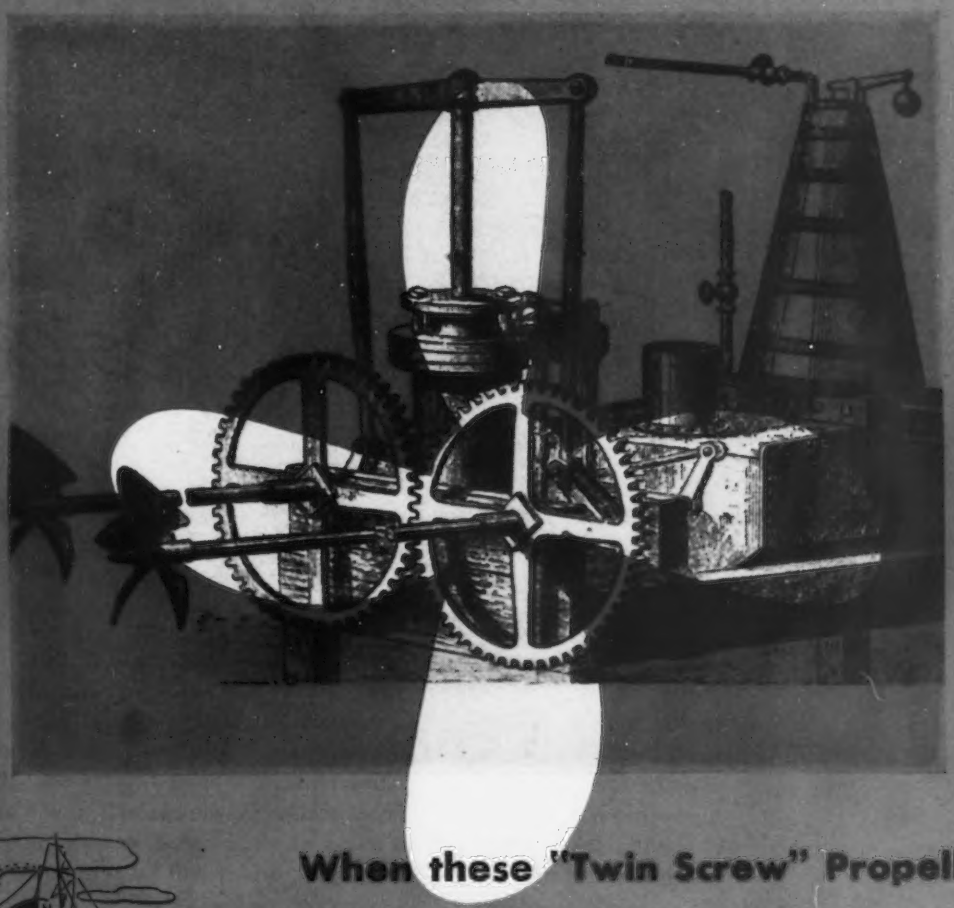
Washington

• • • **Development of** metallurgical techniques which will permit increased milling of the red iron ores of Birmingham is reported in a publication released by the Bureau of Mines which reviews several years of intensive Bureau research on methods of dressing and concentrating these low-grade ores.

Prepared by Will H. Coghill, Chief of the Tuscaloosa, Ala., Div. of the Bureau's Metallurgical Branch, and G. Dale Coe, an associate chemical engineer in the same office, the publication is designed to provide operators with the latest data on the mineral-dressing characteristics of the five main seams of the Red Mountain ores. Information obtained during the Bureau's investigations also will help individual producers evaluate the economic feasibility of various milling methods in their operations.

In discussing the beneficiation techniques currently employed in the Birmingham iron industry, the publication states that only gravity concentration by classification and tabling and magnetic concentration following reduction roasting now are in use on a commercial scale. Only a small proportion of the ore mined is beneficiated by these systems, and the publication suggests that producers investigate the practicability of larger-scale milling operations. However, the publication also points out that, because of an acute shortage of trained milling personnel, "many years

MILESTONES IN AMERICAN INDUSTRIAL DEVELOPMENT



When these "Twin Screw" Propellers made their bow... America was using "Standard" products

The twin screws that drive America's latest, finest ships aren't a recent invention. John Stevens built several steamboats before Fulton's Clermont stole the show, and in 1802 he produced the propellers illustrated here with the engine and tubular boiler. Years elapsed before the screw propeller came into general use . . . but it stands as an important milestone in industrial development.

While Stevens' propellers were still an exciting novelty, Freedom Forge, direct ancestor of Standard Steel, had already served industry for 7 years. Today, at the same location, Baldwin's Standard Steel Works Division brings 152 years of accumulated experience to bear on quality forging and casting production. Facilities permit the production of all types of steel castings from 5 pounds to 100,000 pounds, and forgings up to 25 tons in weight.

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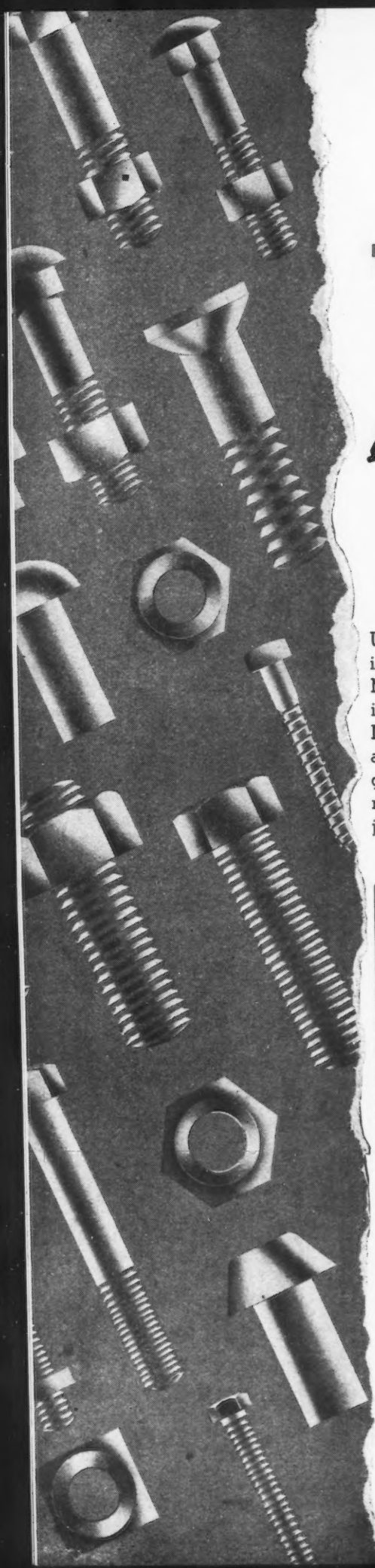

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Screw Threads for High Temperature Bolting . . . as oil refineries, steam power plants and similar industrial processes adopt higher temperatures, high temperature bolting becomes an important problem.

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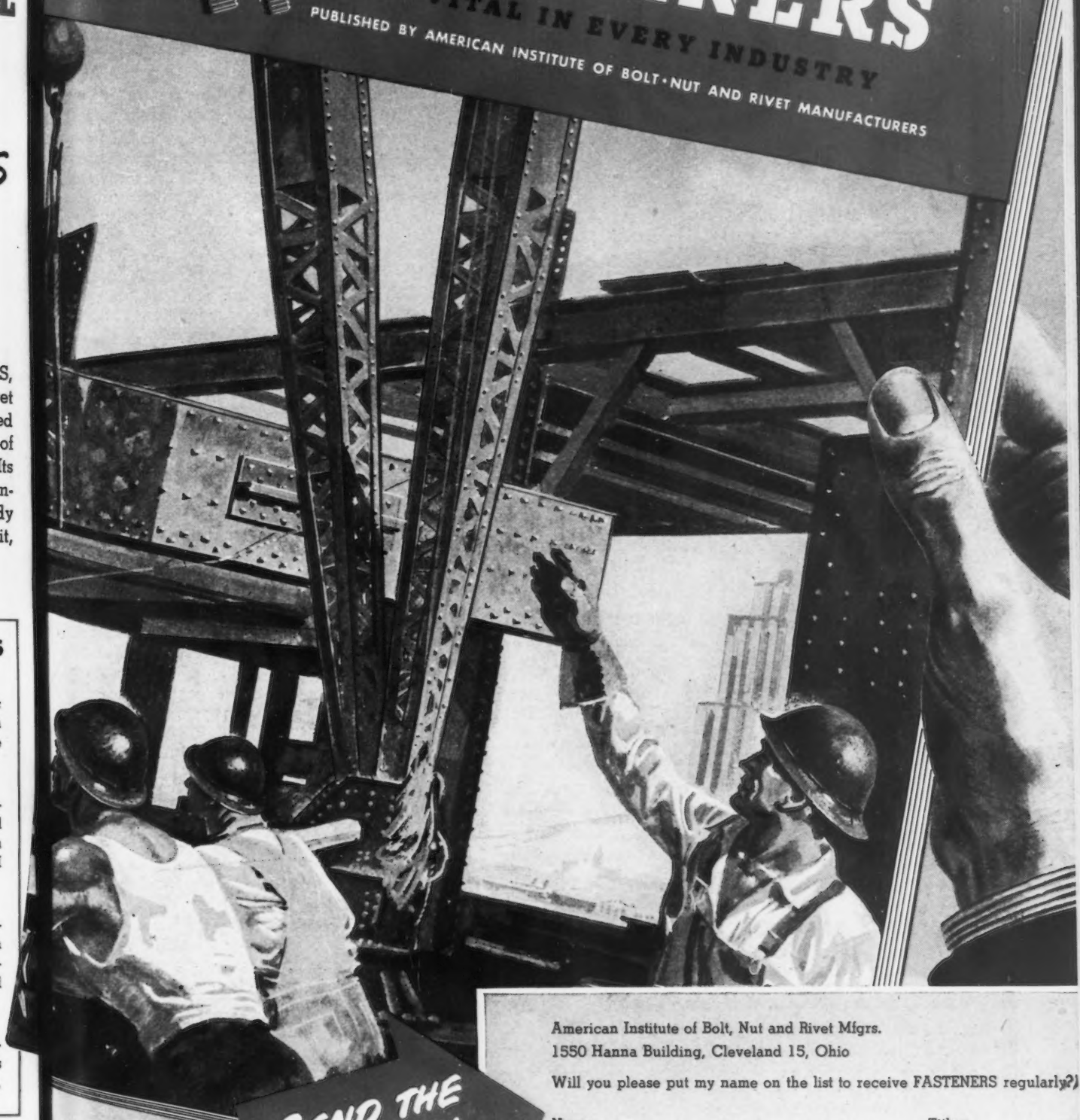

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will elapse before milling in the Birmingham district catches up with mining."

The Bureau's 99-page bulletin reviews mining and smelting in Alabama, and deals with such topics as the geography and geology of the Birmingham iron district, as well as the beneficiation investigations on the Red Mountain ores. Numerous photomicrographs of Red Mountain iron-ore specimens are also included in an appendix.

To obtain the extensive data presented in the bulletin, Bureau investigators collected and examined many hundreds of ore samples. All specimens were subjected to a variety of tests and metallurgical treatments, including sink-float tests, precision-batch jigging, wet and dry crushing, grinding, scuffing and attrition scrubbing, and direct magnetic separation. Tables showing the results obtained by the various metallurgical processes as well as descriptions of the testing procedures employed are given in the publication.

Because all of the Red Mountain ores are characterized by the presence of particles of sea sand cemented together by low-grade hematite, clay and limestone, they present a particularly difficult beneficiation problem, the bulletin states. However, several years of careful research by Bureau metallurgists have yielded some effective methods of concentrating these off-grade deposits.

A copy of the publication, bulletin 464, "Mineral-Dressing Characteristics of the Red Iron Ores of Birmingham, Ala," may be obtained for 35¢ only from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The publication is not for sale by the Bureau of Mines.

WAA Alters Lease Date

Washington

• • • WAA has announced that the effective date for the signing of a definitive lease by the Tucker Corp. for the former Dodge-Chrysler aircraft engine plant in Chicago has been extended for 4 months. The closing date previously had been set for Mar. 1, but under a new agreement, an extension to July 1 has been granted.

Two Reports on Sponge Iron Progress Issued By Bureau of Mines

Washington

• • • **Latest developments** in the sponge iron program of the Bureau of Mines are described in two new publications released recently by Dr. R. R. Sayers, Bureau Director.

Sponge iron — now becoming more widely used in the electric steel industry—is a porous product resulting from the reduction of an iron oxide at a temperature so low that fusion does not occur. The two new publications are:

"Pilot-Plant Investigations—Production of Sponge Iron with Producer Gas," by R. G. Knickerbocker, Chief of the Bureau's Metallurgical Branch at Rolla, Mo.; D. R. Torgeson, chemical engineer; and T. E. Evans, associate technologist—both formerly with the Bureau's Metallurgical Branch at Boulder City, Nev.

Results of work done at the Bureau's Experiment Station at Boulder City show that sponge iron may be produced in a multiple-hearth furnace by reduction with a low-quality gas under certain conditions. Although only 50 pct of the reducing capacity of the gas was used, the spent gas can be regenerated or utilized in other ways, for it is not inferior to many types of blast-furnace gases employed economically in iron and steel plants, the report states. Reduction of 85 to 90 pct of the iron to metallic condition was achieved.

Although continuous production of sponge iron by gaseous reduction must await new mechanical procedures, success would permit utilization of large reserves of western noncoking bituminous coals and lignites near iron ore deposits. The publication describes the equipment used and the results achieved in six pilot-plant operating campaigns over a period of 8 months.

"Pilot-Plant Production of High-Grade Magnetite Concentrates, Cranberry, N. C.," by Frank D. Lamb and D. A. Woodward—both metallurgists with the Bureau's Metallurgical Branch at College Park, Md.

Early in 1944, North Carolina and Tennessee were surveyed in

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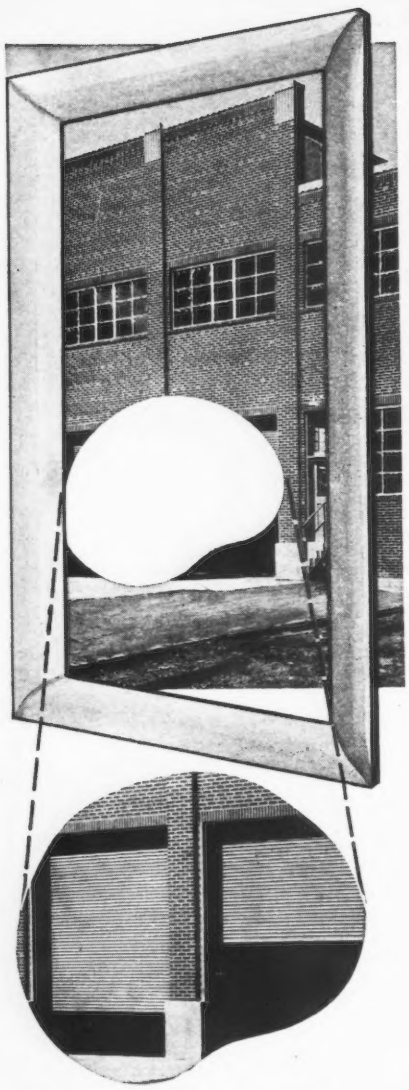

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Saving Ways in Doorways
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ROLLING DOORS

a search for a readily available source of high grade iron ore for use in the production of sponge iron at the Bureau's experimental laboratory at Salisbury, N. C.

A good grade ore was found near Cranberry, N. C., and a 40-ton-a-day pilot mill was built to produce a concentrate of 70 pct or more iron for direct reduction tests at Salisbury. The milling operation was successful, and the report contains a flow sheet for a proposed 100-ton mill, estimated to cost $80,344. Direct operating cost for this plant is estimated to be 84¢ per ton of feed, not including mining costs, amortization, taxes, interest, insurance or freight charges.

A free copy of either or both of these reports may be obtained from the Bureau of Mines, Dept. of the Interior, Washington 25, D. C.

Ponders Soil Pipe Changes

Washington

• • • **CPA and the Housing Expediter** have taken under consideration the elimination of the present order requiring cast iron soil pipe producers to restrict at least 93 pct of their monthly production to sizes 5 in. or less. Facilities for making the larger sizes are available and lifting of the order would not reduce the output of the smaller sizes, it was said.

Retention of premium payments on soil pipe production was recommended. Since this results in a 6-day production week, it was feared that dropping subsidies would return the 5-day week.

Also recommended was the continued allocation of pig iron in order to assure continued high levels of soil pipe production.

Sets Price on Brass Plant

Washington

• • • **In a counter-proposal** to the Bridgeport Brass Co., wartime operator and prospective purchaser of an Indianapolis brass fabricating plant, WAA has set $3,653,000 as the sale price for the plant. Previous proposals by the Bridgeport Brass Co. to buy the plant were rejected by WAA as inadequate. The highest of these was $3,623,000. The plant has a rated capacity of 15 million lb of brass per month.

Urges Guaranteed Wage Be Achieved Through Collective Bargaining

Washington

• • • **Endorsing the** principle of the guaranteed wage as a "significant but not all-sufficient tool" for improving the position of both employee and employer, a special presidential advisory board has recommended such end be accomplished through collective bargaining rather than through legislative action.

Because of the varying conditions which surround and govern each field of endeavor, it was felt that no overall legislative plan would or could be either practical or effective. Each must fit the particular plant or industry.

"Plans guaranteeing wages or employment, when suitably adapted to the needs and conditions of the industry or establishment, are valuable to the entire nation and afford a desirable and wholesome means of improving both worker and employer security," the 11-member board declared in submitting its report to the White House.

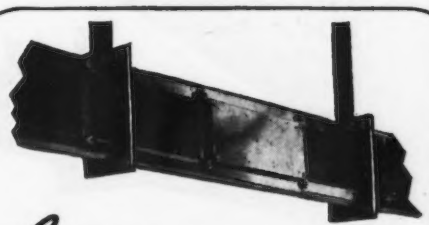
The report itself consists of an extensive study prepared under the direction of Murray W. Latimer with the assistance of Profs. Alvin H. Hanson of Harvard University and Paul A. Samuelson of Massachusetts Institute of Technology. One portion sums up the economic studies of Professors Hanson and Samuelson while the other is a description and classification of guaranteed wage plans, prepared by the Bureau of Labor Statistics.

After completing the study, the board advised President Truman it had come to the following conclusions:

That adoption of guaranteed wage plans should not be the subject of legislative action but left for settlement under collective bargaining.

That being a matter of mutual concern and benefit to workers and management, each has a definite responsibility to attempt to stabilize operations within a plant or industry by working toward such goal.

That there should be a review and coordination of existing wage,



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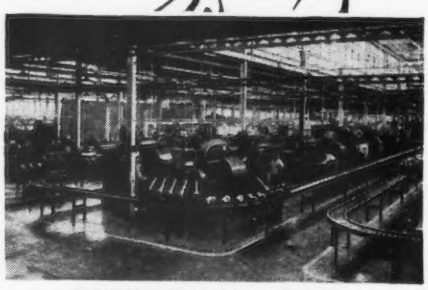
Carrying is the oldest form of material handling—modern production demands faster, cheaper and more efficient material handling — conveyors.

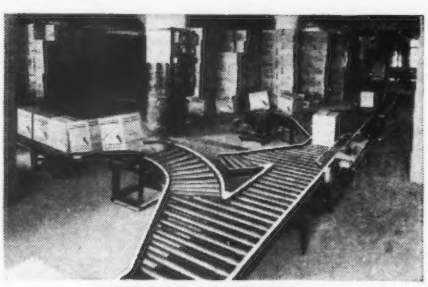
Investigate the use of conveyors. Conveyors handle a wide variety of parts, packages, units, cans, bottles, barrels, bundles, drums and boxes. Available in light, medium or heavy-duty types — portable or stationary — as systems, sections or units — power or gravity fed, they give you remarkable savings in time, money and manpower conservation. They relieve confusion and congestion.

Standard Conveyor Company has the experience and facilities to engineer, recommend and furnish the right type of conveyor for your particular needs.

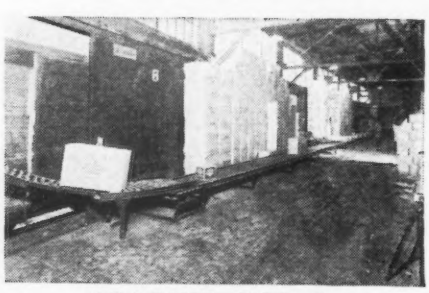
Write today for catalog No. IA-37 "Conveyors by Standard" — a ready reference on conveyor types and systems.



PRODUCTION LINES
No congestion — order and cleanliness when production moves on conveyors.



WAREHOUSES
Merchandise flows in and out of storage with order and system on conveyors.



LOADING DOCKS
Load or unload shipments in half the time with conveyors.

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Sales and Service in Principal Cities

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social security, taxes, and other legislation having a bearing stabilization of employment and income.

That while the guaranteed wage marks a significant move in building national economic security, it is not an all-sufficient tool for the purpose.

And, that the government continue its studies along this line and that governmental agencies should gather, correlate and provide data and information and other assistance to those interested in wage or employment guarantees.

George W. Taylor, former member of the National Labor Relations Board, is chairman of the special advisory panel of OWMR which took up the study at the request of the late President Roosevelt. Other members are:

Philip Murray, president of the CIO; William Green, head of the AFL; Eric Johnston, president of Motion Picture Distributors and former head of the U. S. Chamber of Commerce; Anna M. Rosenberg, chairman of the New York City Veterans Service Committee and private consultant; A. S. Goss, president of the National Grange; James G. Patton, president, Farm Cooperative Unions; Edward A. O'Neal, president, Farm Bureau; Nathaniel Dyke, Jr., industrialist and special consultant to the FDIC; T. C. Cashen, president of several railroad unions; and George H. Mead, president, Mead Corp.

Lakey Foundry Net Down

Detroit

• • • **Lakey Foundry** & Machine Co., Muskegon, has reported a net profit of $217,100 or 44¢ a share for the fiscal year 1946 ended October 31st. Net profits for the 1945 fiscal year were $319,633 or 65¢ a share.

Lakey announced that unfilled orders currently amount to more than $9 million. Since VJ-Day new equipment including nearly a mile and a half of power conveyors have been installed as part of an overall modernization program, according to J. O. Ostergren, president of the company.

Robena Coal Blended Seven Times Before Conversion to Coke

Pittsburgh

• • • **Coal from the** big new Robena mine, 61 miles south of here is blended as many as seven separate times before being converted into the uniform quality coke required to fuel the Pittsburgh district mills of U. S. Steel Corp., according to the company. Five blendings, one of them to "mathematical precision," are performed on the mine property, which is operated by H. C. Frick Coke Co., a subsidiary, and the remaining two times following the coal's arrival by barge at the Clairton, Pa., by-product coke plant of Carnegie-Illinois Steel Corp.

Blending begins at the working face, where samples are taken to determine the sulphur content of the coal. On the basis of these samples, the order in which the coal is mined in various mine locations is fixed so that an average quality may be maintained for months at a time.

In the technical sense of the term, blending begins at the two 10-car rotary dumps, where the mine cars unload their cargo, twenty 6½-ton cars at a time. The car trips are classified in accordance with the average sulfur content of the coal as determined from sampling. Higher sulfur coal goes to one rotary dump while the cars from sections having a lower sulfur analysis are fed to the second. In the dumping operation, some 130 tons of coal from two mine locations and of different chemical compositions are mixed in the first blending.

From the dump bins, 10 apron feeders, each taking a crosswise slice from various locations, carry the coal to the main conveyor belt. Thus part of each carload goes aboard the conveyor belt in a second blending.

The main conveyor belt carries coal up the slope to the screening and crushing plant where coal larger than 3 in. is separated from the smaller. The larger coal passes over picking tables where refuse is removed, thence to crushers which reduce lump coal to 3 in. and smaller. The crushed lump then rejoins the natural 3-in. and under size on the conveyor leading from the

HOW TO SPEED PRODUCTION *with Safety and* SPENCER VACUUM

SEALING BAGS

BENCH CLEANING

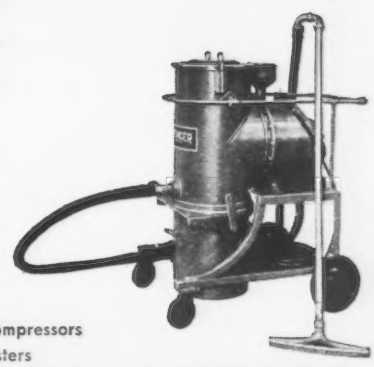
RECLAIMING BABBITT

CLEANING ENAMEL STENCILS

Any production man with imagination can apply Spencer Vacuum to improve or increase production, in a new way.

Four examples are shown on this page. Air is removed from paper bags before sealing. Bench operators pull dust out of instruments and parts instead of blowing it all over the plant. An engine manufacturer recovers babbitt on the production line, and enamel dust is removed from stencils.

The same Spencer Vacuum machine, portable or stationary, cleans floors, walls, ceilings and machinery better, faster and at less cost.


1½ H.P. PORTABLE

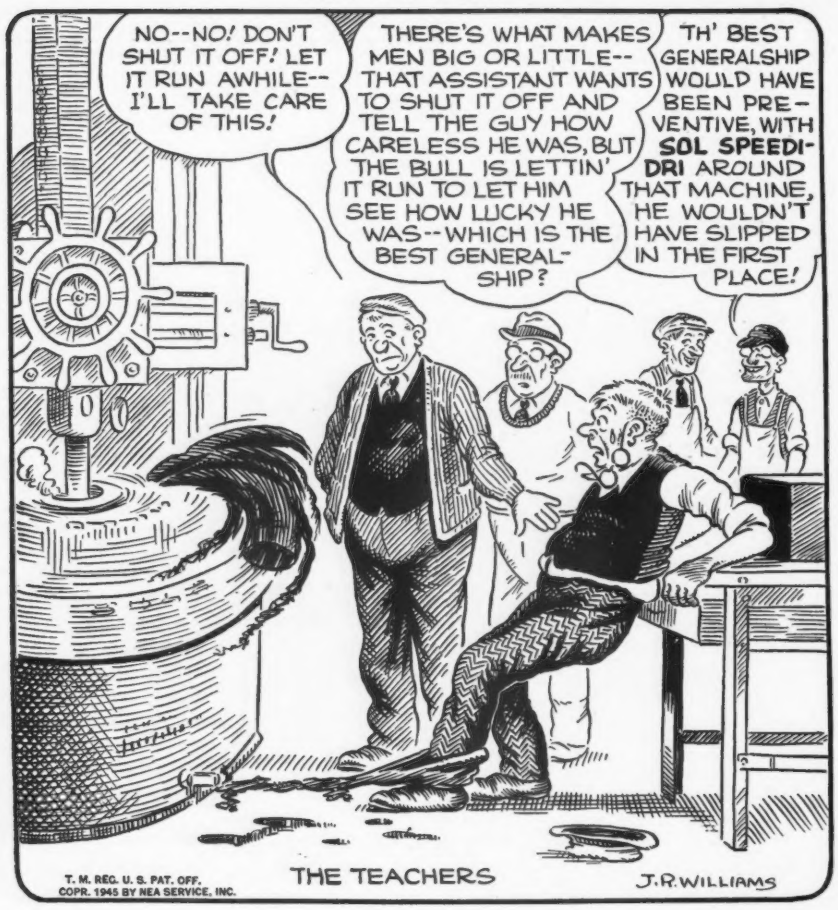
ASK FOR THE BULLETINS:

No. 131—General Information
No. 116—Piping and Valves
No. 137—Boiler Cleaning
No. 102—Portable Vacuum Cleaners
No. 125—Central Vacuum Cleaners
No. 130—Sump Tank Cleaner
No. 143—Pneumatic Conveying
No. 142—Turbo-Agitation
No. 127—Turbo-Compressors
No. 109—Gas Boosters
No. 112—Foundry Blowers

324-B

SPENCER HARTFORD VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.


NO--NO! DON'T SHUT IT OFF! LET IT RUN AWHILE-- I'LL TAKE CARE OF THIS!
THERE'S WHAT MAKES MEN BIG OR LITTLE-- THAT ASSISTANT WANTS TO SHUT IT OFF AND TELL THE GUY HOW CARELESS HE WAS, BUT THE BULL IS LETTIN' IT RUN TO LET HIM SEE HOW LUCKY HE WAS--WHICH IS THE BEST GENERAL-SHIP?
TH' BEST GENERALSHIP WOULD HAVE BEEN PRE-VENTIVE, WITH SOL SPEEDI-DRI AROUND THAT MACHINE, HE WOULDN'T HAVE SLIPPED IN THE FIRST PLACE!
T. M. REG. U. S. PAT. OFF. COPR. 1945 BY NEA SERVICE, INC.
THE TEACHERS
J.R.WILLIAMS

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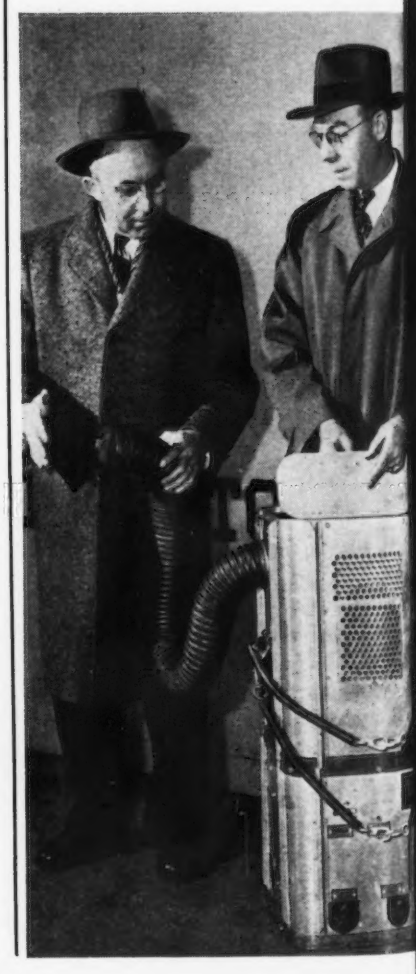
screening plant. While this phase of the operation is not strictly regarded as blending, it is important to the main blending which follows, according to Mr. McMorris Jr., a Frick official.

From the screening plant the coal is conveyed to an 18,000-ton blending bin, which consists of three rows of pockets, 14 pockets to a row. At the bottom of each of the 42 pockets is a feeder gate opening to one of 14 cross feeder belts which lead to the main collector belt. The feeder gates are opened to permit the withdrawal of coal to the tipple from one of the 14 pocket rows at a time.

"This third blending is the most thorough of all," said Mr. McMorris. "The 42-pocket bin was de-

ANTIFREEZE UNIT: *E. E. Guy, right, Fruit Growers Express Co., shows S. B. Phillips, Philadelphia, a new thermostatically controlled portable alcohol heater designed to keep perishables from freezing in transit in refrigerator cars.*



signed with the utmost mathematical precision."

In any blending operation, he explained, it is important that segregation of sizes be minimized, if not eliminated. The crushing operation helps to reduce segregation. To reduce further the tendency of finer coal to separate from coarser coal in the pockets, he said, each of the 42 pockets is subdivided into 4 tall, narrow, vertical cells, a single cell holding about 108 tons of coal. Each cell measures 7½ x 11 ft in cross section, as against 56 ft in height.

"One row of 14 pockets, or double row of 56 cells, holds a little more than 6000 tons of coal—56 cell batches," Mr. McMorris continued. "As coal is withdrawn from one row of pockets, while another row is being filled, a portion of each of the 56 cell batches is blended with a similar portion of the other 55 batches. The chemical compositions may vary in the operating sections of the mine but as each section is represented in the 6000 tons pouring rapidly into pocket after pocket of each row, the 6000 tons leaving the blending bin on the conveyor to the tipple must be of relatively uniform average analysis."

At the top of the tipple coal from the collector belt is layer-loaded into 14 tipple pockets, making a fourth blend.

From the bottoms of these pockets seven feeder belts, operating simultaneously, feed the coal to barge-loading chutes. This is the fifth blend.

The seven chutes form seven piles of coal in the barge. These seven piles are blended for the sixth time when the entire barge is unloaded.

On its arrival at Clairton some of the coal from Robena mine becomes just another layer on the 250,000 ton coke oven stockpile, where it is stocked with coals from various points in the Pittsburgh district. When coal is fed to the coke ovens from the stockpile, it is sliced off to make certain each load contains coal from various points, assuring a standard coke product from the ovens. When stock coal is used. the coal from Robena has been blended a total of seven times.

Eventually Robena is scheduled to ship 20,000 tons of coal a day. This is enough in one day to heat 2000 average homes for the entire winter.

In Wright Cyclone Aircraft Engines, Ampco Extruded Bronze is specified for bushings, fuel injection nozzle inserts, and other parts — for its efficiency at extreme temperatures, its corrosion resistance, and its strength-weight ratio.

Flyin' high-and lasting longer because they're Ampco extruded bronze

Wear-resistant aircraft parts cost less when machined from Ampco extruded stock

Exceptionally high strength-to-weight ratio is an indispensable asset for aircraft parts. This quality is one of seven outstanding performance advantages of Ampco aluminum bronzes—advantages which give *better* and *longer* service for vital parts subject to wear in any application.

Extra economies are afforded when you can use Ampco extruded bronze rods. Extruded stock provides sizes close to most requirements—reducing waste and machining time; the smooth finish and compact structure cuts down rejects caused by physical flaws.

Two grades of Ampco Metal and two grades of Ampcoloy (industrial bronzes) are regularly produced in extruded form by Ampco. Rods in a complete range of sizes are available for immediate shipment. Write for Bulletin 64A for complete details.

Ampco Metal gives these 7 outstanding performance advantages . . . Resistance to — Corrosion • Compression • Impact • Fatigue • Wear — Excellent bearing qualities • Efficiency in extreme temperatures.

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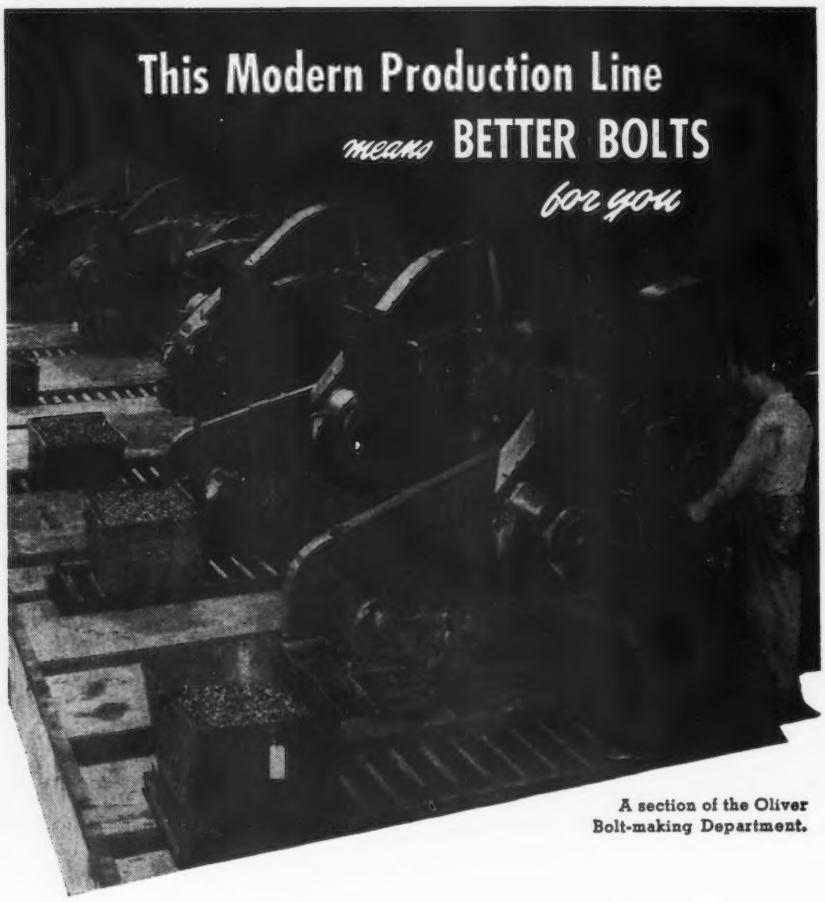
A-33



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OLIVER Fasteners

Dependable uniformity and high quality are features of OLIVER Industrial Fasteners that make these products your best specification. Made by modern production methods and carefully inspected before shipment, Oliver bolts, nuts, screws, rivets and special fasteners fit accurately, thread-on readily and hold firmly.

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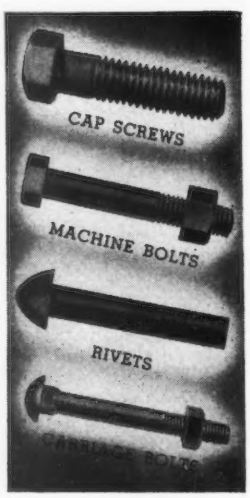

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IRON AND STEEL
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Committee to Sponsor Study of Hydraulics Of Metal Flow in a Mold

Chicago

• • • **The aluminum and** magnesium division research committee of American Foundrymen's Assn. will sponsor a fundamental study of the hydraulics of metal flow in a mold, Dr. R. F. Thomson, International Nickel Co., Detroit, committee chairman, has announced.

Expected to determine optimum gating and risering design for light alloy castings, the investigation should establish proper size and shape of sprues, gates and runners for attainment of nonturbulent flow, Dr. Thomson said. Much of the information obtained, he added, will be equally applicable to the casting of all metals.

The project, he pointed out, has as its objective data which will prove of real assistance on light alloy casting problems, such as misruns, cold shuts, entrapped gas, surface quality, and the ratio of poured to finished weight.

The investigation, recently approved by the association's board of directors, will be under Dr. Thomson's supervision, with S. C. Massari, AFA technical director, as liaison with the institution performing the work.

W. E. Sicha, Aluminum Co. of America, Cleveland, is vice-chairman of the division's research group. Other members are C. E. Nelson, Dow Chemical Co., Midland, Mich.; T. D. Stay, Reynolds Metal Co., and Walter Bonsack, National Smelting Co., both of Cleveland, and W. J. Klayer, Aluminum Industries, Inc., Cincinnati.

R. E. Ward, Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., is aluminum and magnesium division chairman.

McLouth Steel Net Soars

Detroit

• • • **McLouth Steel Corp.,** Detroit, reported net profits for the year ended Dec. 31, 1946 of $734,291.42 compared with $146,093.93 in 1945.

Directors declared a dividend of 25¢ per share on the $5 par common stock, payable Mar. 15 to stockholders of record Mar. 8.

CPA Foresees Continued Shortage of Aluminum Throughout the Year

Washington

• • • **Production of** 1.1 billion lb of aluminum in 1947 is predicted by CPA, 500 million lb less than estimated requirements of 1.6 billion lb. Declaring that the expected output this year is more than three times that of 1939, CPA explained that greater use of aluminum in prefabricated home building and the utilization of the metal for many new purposes keep its demand at a level far above prewar days.

Manufacturers predict that 2 million aluminum residential windows will be made in 1947. Corrugated aluminum sheet is used for farm and industrial roofing and siding. Increased aluminum tonnage goes into motor boats, canoes, and sailboats. Truck trailers and buses require more aluminum for body and axle construction. Automotive and diesel pistons are made of aluminum and the use of the metal for bearings and bushings is growing monthly. Twelve states will be using aluminum license plates during 1947-48.

Postwar domestic refrigerators will average five times as much aluminum per unit as prewar models, manufacturers predict, and a large quantity of the metal is going into clothesline wire, clothes pins, cigarette lighters, tooth paste and shaving cream tubes, milk bottle caps and into foil packaging for drugs, foods, cigarettes and similar products.

Three bottlenecks are said to hold production below the all-time high of 1.8 billion lb produced in 1943:

1. Insufficient soda ash. The 160,000 lb of soda ash needed to produce 1.1 billion lb of aluminum in 1947 is less than 4 pct of the total annual production, but because of requirements in other industries, including steel, manufacturers of aluminum cannot increase their purchases of ash enough to raise alumina output.

2. Aluminum manufacturers are finding it difficult or impossible to buy electric power at an economical rate.

3. Fabrication differences between aluminum for military use (mostly for aircraft which took

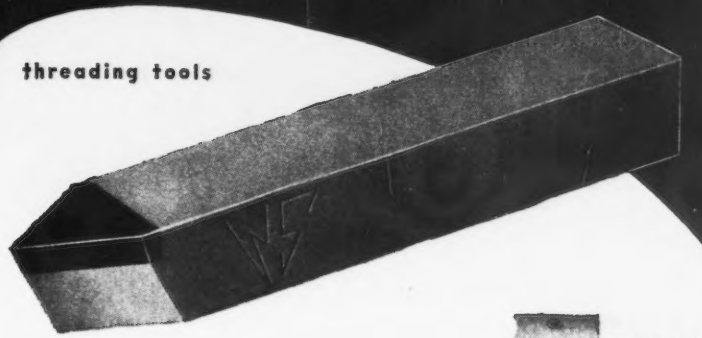
sheave cutters

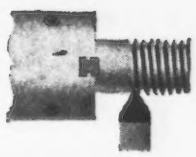
For

PRODUCTION GROOVING AND THREAD CUTTING

WENDT-SONIS CARBIDE TOOLS

threading tools





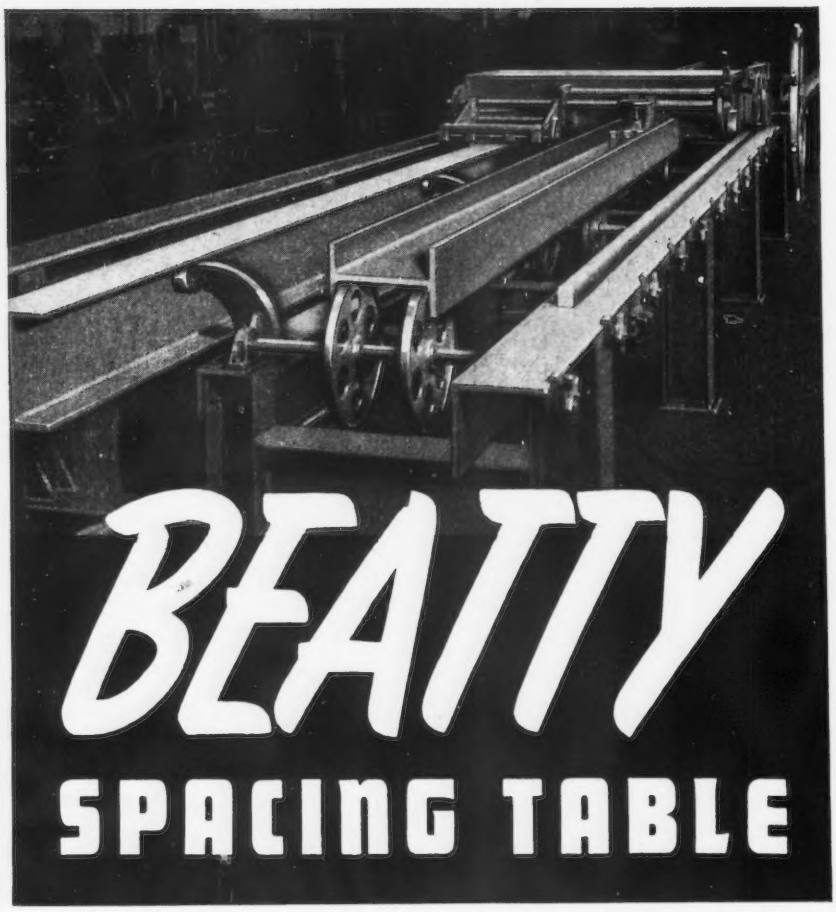
Now! Grooving and thread cutting operations can be done faster, more economically with Wendt-Sonis Carbide Tools. Each tool is especially designed for its job. Available from stock in a wide range of sizes and grades. Shanks scientifically hardened. Cutting angles are based on exhaustive tests made under actual production conditions. Use Wendt-Sonis Carbide Tools to increase your production — help combat rising costs. Get complete details by writing WENDT-SONIS COMPANY, Hannibal, Missouri or 580 North Prairie Avenue, Hawthorne, California.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

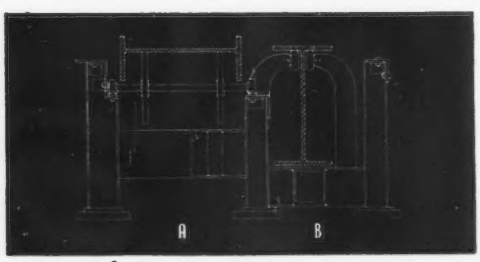
BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER TURNING TOOLS • SPECIAL BITS

New! Fast!



BEATTY SPACING TABLE

Now, handle varying weights and sizes of I-Beams, for flange punching, without any compensating adjustment in the spacing table! Speed production! Lower costs! The new BEATTY SPACING TABLE carries I-Beams on the underside of the top flange, which is always at die level and free to pass over the dies. Gear rack on both sides maintains an even movement of the carriage down the length of the table. Rolls and roll shafts mounted in self-aligning, anti-friction bearing; spacing table likewise anti-friction bearing equipped. Write us today for detailed specifications.



Instead of carrying beams by the underside of bottom flange — as conventional models do — the new BEATTY Spacing Table carries an I-Beam for flange punching as shown in "B", at left. Arms open and close by air pressure to receive beam. It's easy to operate, profitable to own! Write today for all the facts.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

one sheet type and one alloy) and peacetime goods which require finished aluminum of many alloys.

Of the five plants which during the war extracted alumina from bauxite ore—Mobile, Ala.; East St. Louis, Ill.; Baton Rouge, La.; Hurricane Creek, Ark.; and Lister Hill, Ala.—only the first four are in operation, CPA said.

Five aluminum plants also stand idle: Burlington, N. J.; Los Angeles, Calif.; Riverbank, Calif.; Maspeth, N. Y.; and St. Lawrence, N. Y. All the other aluminum plants are in use: Spokane, Wash.; Alcoa, Tenn.; Baden, N. C.; Vancouver, Wash.; Tacoma, Wash.; Jones Mill, Ark.; Lister Hill, Ala.; Troutdale, Ore.; Massena, N. Y.; and Longview, Wash.

Automotive & Aviation Parts Manufacturers Elect New Officers

Detroit

• • • **Newly elected officers** of the Automotive & Aviation Parts Manufacturers, Inc., for the 1947 term are: president, John Airey, president of King-Seeley Corp., Ann Arbor, Mich.; vice-president, George W. Kennedy, president of Kelsey-Hayes Wheel Co., Detroit; and secretary-treasurer, James L. Myers, executive vice-president of Cleveland Graphite Bronze Co.

President Airey succeeds Frederick C. Crawford, of Thompson Products, Inc. The association membership now numbers approximately 400 plants in the automotive and aircraft parts industries, according to Frank Rising, general manager.

New directors include Wendell W. Anderson, Bundy Tubing Co., Detroit; K. J. Ammerman, Borg-Warner Corp., Chicago; C. C. Carlton, Motor Wheel Corp., Lansing, Mich.; R. H. Daisley, Eaton Mfg. Co., Detroit; and F. C. Greenhill, Acklin Stamping Co., Toledo.

Directors retaining office include: F. C. Crawford; W. A. Baker, Firestone Steel Products Co., Wyandotte, Mich.; F. L. Burke, General Motors Corp., Detroit; J. D. Eby, Wagner Electric Co., St. Louis; D. H. Kelly, Electric Auto-Lite Co., Toledo; Walter F. Rockwell, Timken-Detroit Axle Co., Detroit; and J. Y. Scott, Van Norman Co., Springfield, Mass.

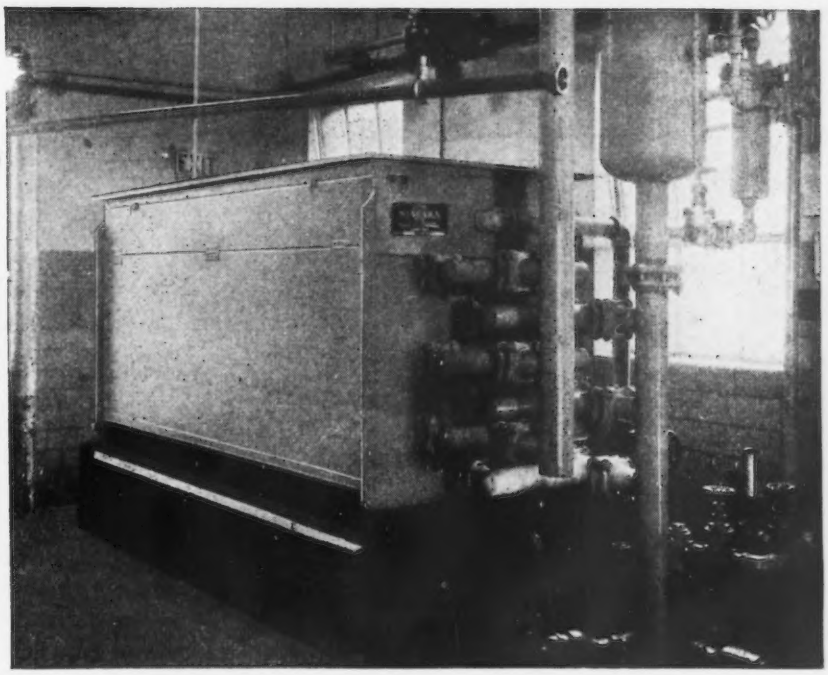
FTC Recommends That Export Screw Group Readjust Practices

Washington

• • • **Recommendations have** been made by the Federal Trade Commission to the Export Screw Assn., Providence, R. I., and its member companies that they readjust their business to eliminate practices found to be violative of the anti-trust laws. This move by FTC was based on a formal investigation conducted under the Webb-Pomerence Export Trade Act under which the association was organized. Its members make iron and brass screws for use in wood construction.

Recommendations, which in effect amount to orders, would bar the association from participating in practices that are alleged to have restricted competition in world markets. The association was given 30 days from Feb. 21 to file a report with the commission stating whether the association had complied with the recommendations.

Of the four recommendations the first would prohibit such practices as participating in the purchase of the Falu Works of Sweden, by means of which foreign competitors who have shipped or may ship their products into the United States are eliminated or their production terminated or abandoned; agreement with the International Union of Wood Screw Manufacturers by means of which the United States was agreed upon as the home market for members of the association and the importation of wood screws into this country by members of the union was prevented; such practice as the association's cooperation with the International Union whereby machinery for the making of wood screws was purchased or sequestered and made unavailable to manufacturers or potential manufacturers of wood screws; undertaking an agreement such as the agreement between the Association and Guest, Keen & Nettlefolds, Ltd., Birmingham, England, a foreign competitor, whereby export of wood screws from foreign countries into the United States and its territories



NIAGARA LIQUID COOLER
Gives High Capacity in Small Space

Cold water, chilled to 33° F., or cold liquids, or non-freezing solutions below 32° F. are produced economically by the new Niagara Liquid Cooler.

For large capacity equipment it is most compact. For example, one model furnishes 92 gallons per minute of water cooled from 45° F. to 35° F., with 28° F. refrigerant temperature, in less than 30 sq. ft. of floor space. Other models . . . from 24 to 465 G. P. M.

Extra advantages are positive temperature control; assurance of holding temperature accurately in spite of variation in cooling load; rapid chilling of the liquid; savings in power and refrigeration consumption.

Write for Bulletin No. 100-IA

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INDUSTRIAL COOLING HEATING • DRYING
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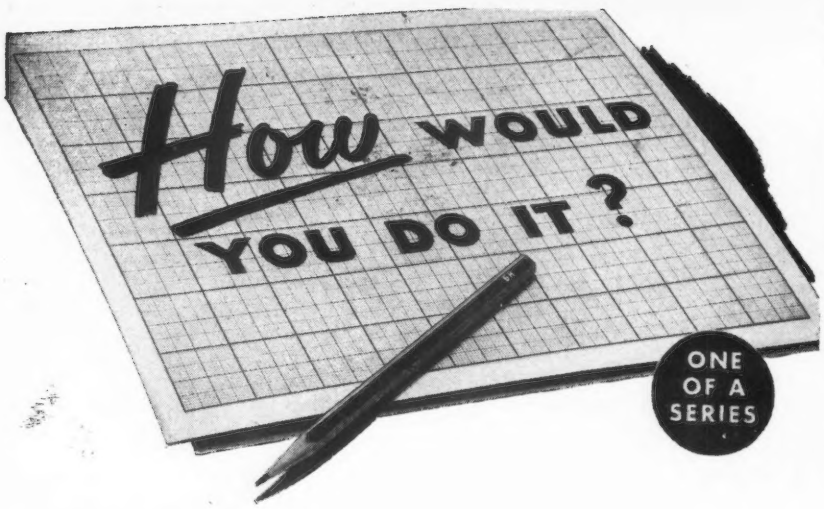
HUMIDIFYING • AIR ENGINEERING EQUIPMENT



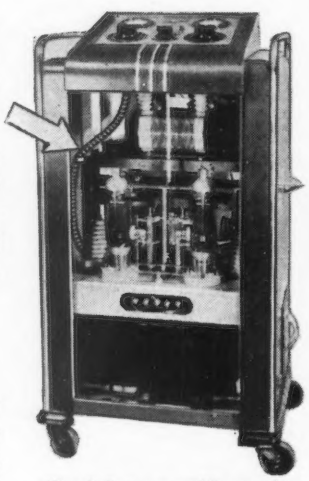
PROBLEM—You are designing a diathermy unit. Included in the electrical circuit are variable elements which must be adjusted during operation. The control knobs must be located where they will be convenient to the operator. The variable elements themselves must be located in the cabinet where they will be easy to mount, to wire and to service. How would you do it?

THE SIMPLE ANSWER

Use an S.S.White remote control type flexible shaft to couple each variable element to its control knob. This simple arrangement makes it possible to place the elements and their controls anywhere you want them. And you will find, too, that operation with these shafts is as smooth and sensitive as a direct connection, because S.S.White remote control flexible shafts are designed and built especially for this type of duty.

★ ★

This is just one of hundreds of remote control and power drive problems to which S.S.White flexible shafts provide a simple answer. That's why every engineer should be familiar with the range and scope of these "Metal Muscles"* for mechanical bodies.



Here's how one well known electronic equipment manufacturer did it. The flexible shaft (arrow) connects control knob at top to a variable element at the bottom rear.

WRITE FOR THIS 260-PAGE HANDBOOK
It gives complete facts and technical data about flexible shafts and their application. A copy is yours free if you will request it on your business letterhead and state your position.

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Work Started on New Atomic Laboratory To Have a Staff of 1000

New York

• • • **Brookhaven** National Laboratory for atomic research, a government-owned, government-financed project operated by Associated Universities, Inc., under contract with the United States Atomic Energy Commission, is under construction on the 6000-acre site of Camp Upton, Brookhaven Township, Long Island, N. Y.

The laboratory will provide to universities, industries, and other research organizations in the Northeastern and Middle Atlantic states a training and research center for the investigation of atomic energy. It will be equipped with facilities beyond the reach of individual institutions.

Trustees of Associated Universities, Inc., and officers of the Laboratory expect it ultimately to have a permanent scientific staff of 300, a visiting staff from cooperating institutions of 200 or more, 500 laboratory technicians, and administrative, service, and maintenance personnel numbering about 1000. Some 100 scientists will have been assigned by fall, 1947. Scientific activities, including the design of an atomic pile and other large equipment, are already underway, under the direction of Dr. Philip M. Morse, director.

The research program of the Laboratory will be directed primarily to the development of new fundamental scientific information on the nature and properties of atomic energy and other applications of atomic techniques.

Foreign Service Group Hears of Federal Plans To Promote U. S. Trade

Washington

• • • **Exchange of views on the** activities of governmental officials in promoting the commercial interests of the United States abroad took place on Feb. 26 when a group of leading business men, who are well known in the American foreign trade community, met in the State Dept. in Washington with the Board of Foreign Service. The business men are members of the Advisory Committee on Commercial Activities in the Foreign Service.

The joint meeting was under the chairmanship of John E. Peurifoy, recently appointed acting Assistant Secretary of State for Administration. Norman P. Ness, Director of the Office of Financial and Development Policy, State Dept., discussed current developments in international economic affairs. Selden Chapin, Director General of the Foreign Service, presented a summary of the problems now facing the service and invited comments from the business groups. George Beli, Associate Director of the International Trade in the Dept. of Commerce, called for suggestions as to how government agencies could best meet the demand placed upon them by business and industry in the field of world trade and how they can be correlated with the existing and planned facilities of the Foreign Service.

Among the members of the Advisory Committee are the following:

W. S. Morrison, vice-president in charge of sales, U. S. Steel Export Co.; Frances L. Hopkinson. Vice-President of Willys-Overland Motors, Inc.; J. D. Fletcher, Vice-President, Caterpillar Tractor Co.; Kenneth H. Campbell. manager, Foreign Commerce Dept., Chamber of Commerce of the United States of America; Noel Sargent, secretary, National Association of Manufacturers; William S. Swingle, vice-president, National Foreign Trade Council; Patrick McMahon, special executive assistant, National Association of Manufacturers; and C. B. Thomas, president, Export Div., Chrysler Corp.

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Enameled Shipments Hit New High in 1946

Pittsburgh

• • • **During 1946, porcelain** enamel shipments reached the highest level of the past 10 years —amounting to a total of $74.4 million, according to the Porcelain Enamel Institute. Shipments in 1946 varied from a February low of $4.4 million to a high in October of $8.1 million.

December shipments of porcelain enameled products amounted to $6.9 million, twice as great as the December, 1945, total and 150 per cent greater than in December, 1944.

Stove, refrigerator, and washing machine parts and table tops for breakfast and dinette sets and kitchen cabinets occupied 35 pct of the December, 1946, total. Shipments of store fronts and other porcelain enameled architectural parts were over 7 times greater in December, 1946, than in December, 1945.

LIPSTICK RADIO: *Dr. Cledo Brunetti of U. S. Bureau of Standards holds in his left hand his latest invention—a radio broadcasting set that is fitted into an empty lipstick container. Its range was not disclosed.*

M. A. Hanna Co. Finds Iron Ore Exploration Disappointing in Brazil

Cleveland

• • • **The iron ore exploration** which the M. A. Hanna Co. has been conducting in Brazil has been disappointing and drilling will be discontinued unless there is a change for the better within a few months, according to George M. Humphrey, president.

In his annual report to shareholders, Mr. Humphrey stated that iron ore explorations in Labrador and Quebec are developing satisfactorily, but much more work must be done before they can be safely regarded as offering commercial possibilities.

M. A. Hanna Co. reported record net profit of $5,611,654 for 1946 after all expenses and taxes. Net is equal to $5.05 a common share and compares with the previous high record of $4,813,944, or $4.26 a common share in 1945.

Referring to Pittsburgh Consolidation Coal Co., Mr. Humphrey said: "It is our hope that this coal company in which we are so interested, may so develop its resources and equip its operations with the latest machinery and improvements and serve its customers so well that it can meet the severest competition and continue to be a successful and profitable enterprise."

Except for bituminous coal mining, the Hanna activities continue unchanged, Mr. Humphrey stated.

Raise Alloy Tubing Price

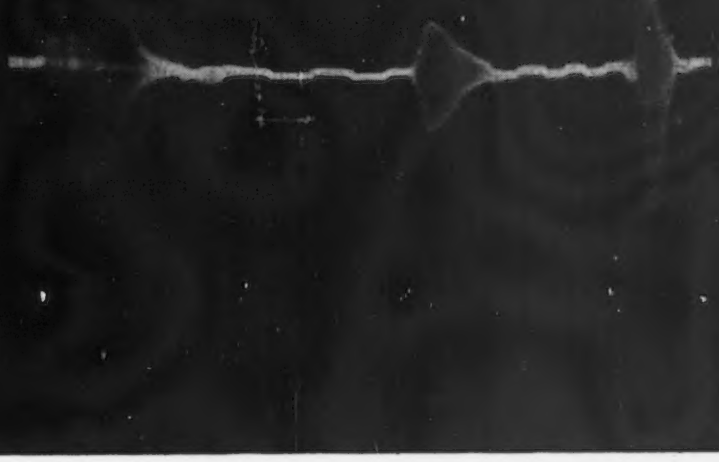
Canton, Ohio

• • • **The Steel & Tube** Div. of The Timken Roller Bearing Co. announces that effective on shipments Feb. 21 new higher prices will be effective on AISI alloy pressure tubing sold on their schedule B-3. New quantity extra brackets are also effective on this schedule as follows:

	Base
40,000 lb or ft or over	
25,000 lb or ft to 39,999 lb or ft	5 pct
12,000 lb or ft to 24,999 lb or ft	12½ pct
6,000 lb or ft to 11,999 lb or ft	25 pct
3,000 lb or ft to 5,999 lb or ft	40 pct
1,500 lb or ft to 2,999 lb or ft	60 pct
500 lb or ft to 1,499 lb or ft	80 pct
0 lb or ft to 499 lb or ft	100 pct

A Breakdown That Will Never Occur

Foreseen by Sperry's Supersonic Reflectoscope!



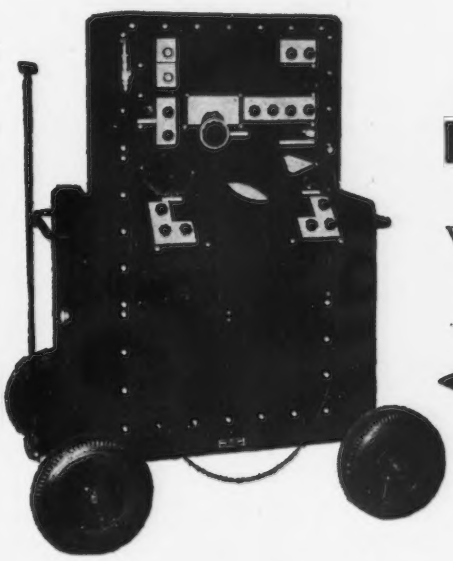
This distorted pattern of light you see across the oscilloscope of a Sperry Supersonic Reflectoscope is indicating accurately and instantly the location of internal defects or flaws — flaws that, undetected, might have cost wasted hours in machining defective material — flaws that might even have caused service failures in the finished product!

Now in wide use throughout industry, the Supersonic Reflectoscope makes possible rapid, effective *non-destructive* testing for internal defects with complete safety — *better quality control.*

Inexpensive to operate, the Reflectoscope will search many metals and alloys to depths in the order of *ten feet.*

Write today for bulletins and data sheets which may help you to solve your quality control problems.

SP-103



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Glenn Martin Engineer Offers New Aging Cycle For Aluminum Alloys

Baltimore

• • • The problem of eliminating production delays caused by the necessity of heat-treating various aluminum alloys for different time periods practically has been solved, according to The Glenn L. Martin Co., here, through the suggestion by Martin's J. Edwin Burkhardt of a time cycle for heat treatment which was found satisfactory for at least four different alloys — 53S, Alclad 14S, R-301 and 61S.

Under the old method, the four alloys were aged at two different time periods; 14S and R-301 were aged together at 350° F for 6 hr, while 53S and 61S were aged together at 350° F for 8 hr. This resulted in delay on rush jobs due to the difference in the time and the necessity either to hold 14S and R-301 for 6 hr while the furnace was being used to age 53S and 61S for 8 hr, or using the engine mount furnace, rivet furnace or wood shop furnace for heat treating some of these alloys.

Under the method suggested by Mr. Burkhardt, the four alloys are all aged together at 350° F for 8 hr or 340° F for 10 hr. This saves at least 40 hr of furnace time each week, and eliminates the need for using other furnaces, thus at the same time eliminating delays in the heat-treat of rivets and motor mounts. There is also a small direct saving of additional loading and unloading, and transportation of aluminum alloys to different furnaces. Storage space is also saved, as it is not necessary to rack up an accumulation of aluminum waiting to be heat-treated. The shop benefits through more efficient planning without the usual heat-treat delay when working the materials that have the same heat-treat specifications.

Either of the time cycles suggested by Mr. Burkhardt has distinct advantages over the old method. The 8 hr treatment at 350° F permits the aging of at least four different alloys in the same furnace load.

The 10 hr treatment at 340° F permits the shop to age this material during the interval between 2nd and 1st shift; the 2nd shift can put it in the furnace, the heat can be run while no one is working, and the day shift can take it out. Either time cycle eliminates the tie-up of other department furnaces and delay in rush jobs. The aging cycles conform with government specifications.

Experimental data shows that for overaging, aging time is not a critical factor. For example, extending the aging time of R-301 at 350° F from 6 to 8 hr involves a drop in tensile strength from 69,000 to 68,750 psi — a negligible amount. The peak value here is obtained at the 6-hr treatment. Under the same conditions, the yield strength increases from 62,000 to 63,000 psi, with the actual peak at the 7-hr period. Similarly, elongation decreases from 10 to 9½ pct.

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Given Named President Of Hygiene Foundation

Pittsburgh

• • • The election of W. B. Given, Jr., president of American Brake Shoe Co., New York, to the board of trustees of Industrial Hygiene Foundation is announced by Andrew Fletcher, Board Chairman.

Mr. Fletcher, executive vice-president of the St. Joseph Lead Co., New York, also announced the election as trustees of F. F. Colcord, vice-president, U. S. Smelting, Refining & Mining Co., New York, and B. E. Kuechle, vice-president, Employers Mutual Liability Insurance Co., Wausau, Wis.

Industrial Hygiene Foundation is a national, nonprofit, research organization for the advancement of employee health in industry and the improvement of working conditions. The Foundation, supported by 335 industrial concerns, maintains its headquarters at Mellon Institute, Pittsburgh.

E. W. Bliss Expands Its Operations at Toledo To Cut Press Backlog

Detroit

• • • **The Toledo plant** of E. W. Bliss Co. is undergoing extensive re-equipping in order to increase the production of power presses, Marshall M. Smith, president, has announced.

Changes include installation of new foundry equipment designed to increase the production of iron castings. A new cupola and blower arrangement, time and temperature controls, and testing and inspection equipment for Meehanite have been installed.

During the past 18 months, new machine tools valued at over $300,000 were installed at the Toledo plant to replace obsolete equipment. New material handling equipment and intraplant trucking facilities are being provided for more efficient operation.

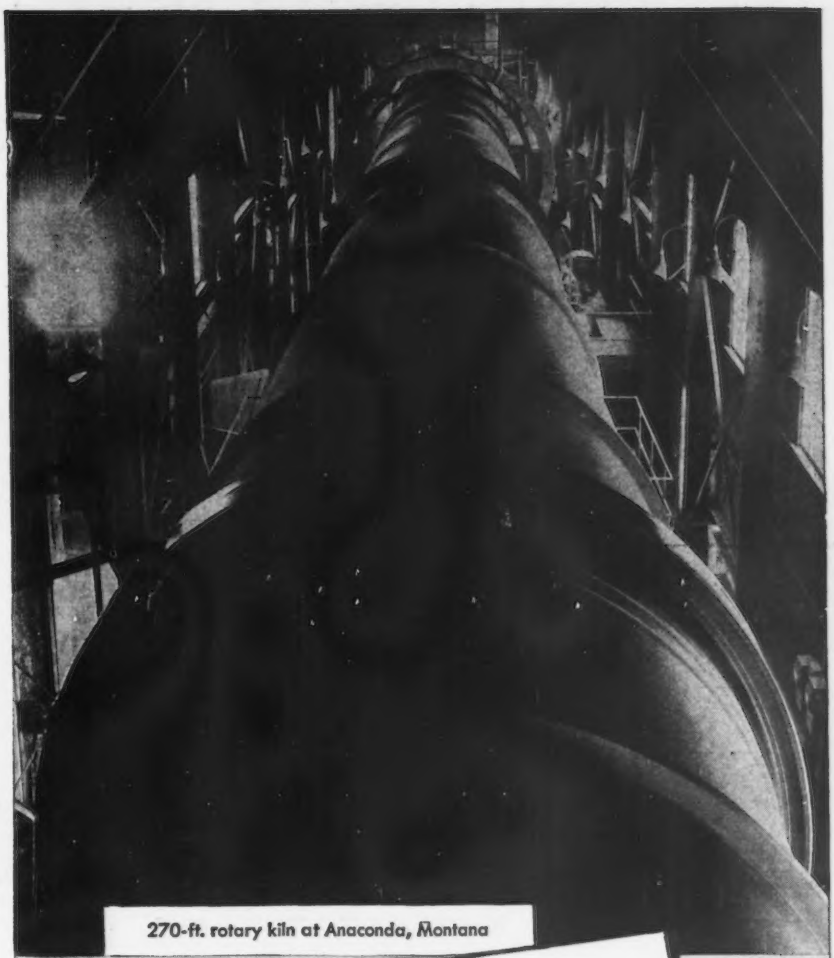
Robert Hinde, recently appointed works manager, supervises all operations at Toledo. Future expansion developments are contingent upon many factors, not the least important being the availability of an adequate and efficient labor supply. At the present time, the company needs a variety of machine tool operators and assemblers for their second shift and urgently requires foundry help of all types.

Dravo Corp. Is Awarded New Boiler Plant Order

Pittsburgh

• • • **The Machinery** Div. of Dravo Corp. will construct a stoker-fired boiler plant at H. C. Frick Co.'s Robena Mine, in Greene County, Pa. The plant will supply steam for heating purposes. One 16,000 lb per hr boiler will be installed, with provision made for a second boiler when needed. Equipment for the plant includes a water softener, deaerating heater, stoker and fly ash arrestor.

The division will also install machinery, equipment, piping and electrical apparatus for the Frick Co.'s new coal cleaning plant. The plant is a new type known as the "Heavy Media Process," in which magnetite is used to aid in the separation of fine material and refuse from the coal.



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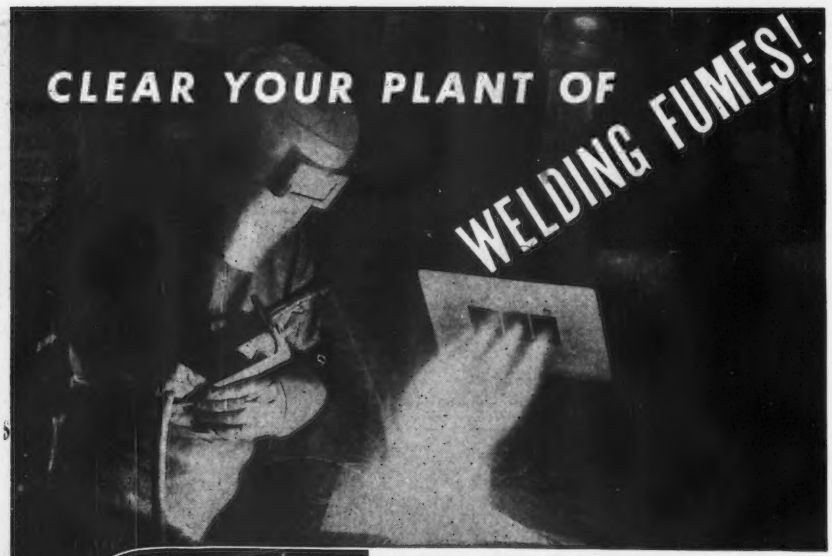

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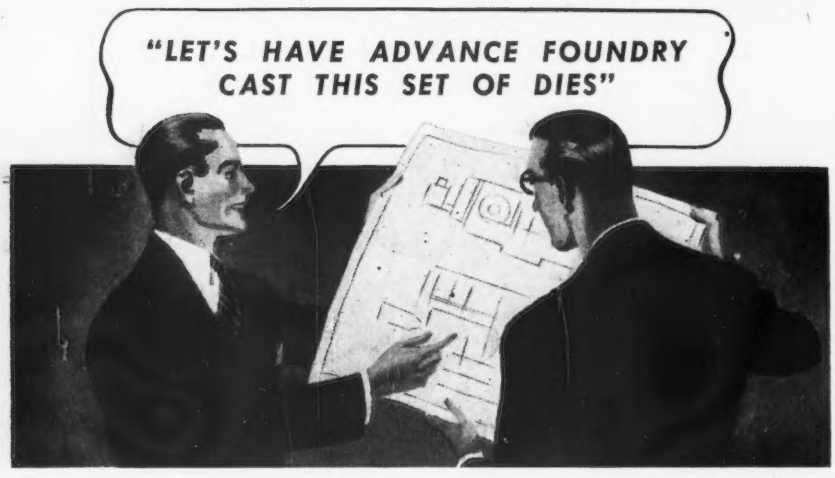

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Weekly Gallup Polls

(CONTINUED FROM PAGE 107)

tinue is a question which only the future can answer.

Meanwhile the Democrats find themselves in a vastly different position today from what they were a few short months ago, when some observers were handing the presidency to anyone the Republicans might choose to put up.

Readers should be reminded that it is not popular votes but electoral votes which elect presidents. Because of the peculiar situation which exists in the South where the overwhelming majority of popular votes go to the Democratic candidate, the Democrats normally need slightly more than 50 pct of the popular vote for the nation as a whole in order to win enough electoral votes to elect their man.

•

• • • **Gov. Thomas E. Dewey,** of New York, continues to head the list of Republican presidential choices for 1948, among the GOP rank and file, a nationwide poll finds.

Dewey's rating has, however, dropped seven percentage points since last December, when a similar poll was made right after his one-sided victory in the New York gubernatorial race.

Meanwhile, former Minnesota Gov. Harold E. Stassen, the only one on the list who has announced his candidacy, holds his own, second on the list of popular preferences.

Two U. S. Senators share third place. They are Sen. Arthur H. Vandenberg, of Michigan, and Sen. Robert A. Taft, of Ohio.

Both of these men are conceded by political experts to be very much in the running for 1948. Vandenberg has of course won wide acclaim in recent months for the part he has played in international affairs. Senator Taft has enhanced his reputation as one of the top Republican figures in the U. S. Senate.

Senator Taft makes a good showing in the current poll. He has picked up a substantial amount of new following since the poll in December.

At that time, only 2 pct of the Republicans polled mentioned him as the man they would like to see

as President in 1948. Today, the figure stands at 8 pct—a jump of six percentage points.

Senator Vandenberg's support remains just about the same as in December.

Even though he has definitely counted himself out of the running, Gen. Dwight D. Eisenhower wins a substantial number of votes in the present poll.

He and Sen. John W. Bricker, GOP vice-presidential candidate in 1944, have the same proportion of support among the GOP rank and file.

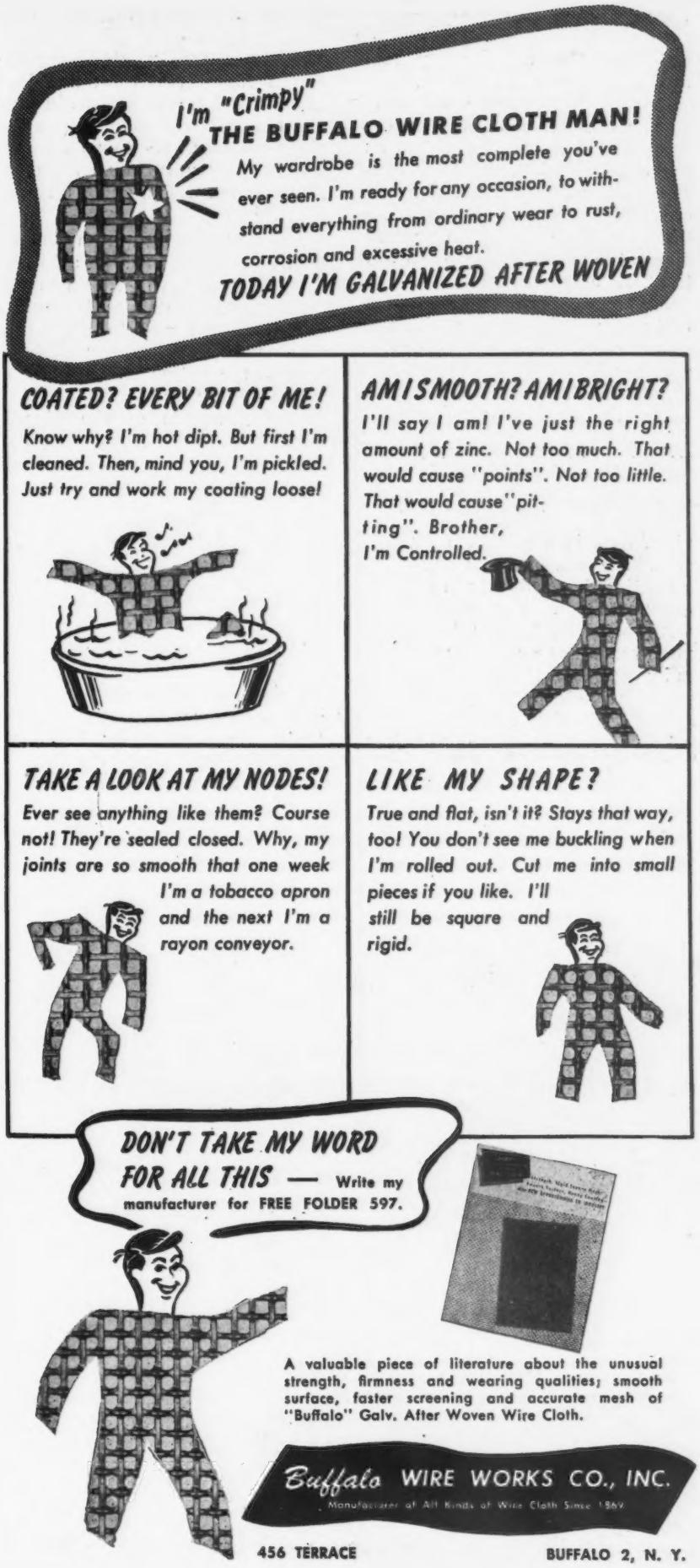
Republican voters naming a choice today for the 1948 GOP nomination divide as follows, as compared to December:

	Today Pct	Dec. '46 Pct
Dewey	45	52
Stassen	18	17
Taft	8	2
Vandenberg	8	9
Bricker	6	8
Eisenhower	6	2
MacArthur	3	2
Warren	3	5
Others	3	3

Other possibilities mentioned included Leveret Saltonstall, U. S. Senator from Massachusetts; Raymond Baldwin, U. S. Senator from Connecticut; Henry Lodge, Jr., U. S. Senator from Massachusetts; Joseph Martin, Jr., Speaker of the House; Edward Martin, Senator from Pennsylvania; Eric Johnston, former President U. S. Chamber of Commerce; former President Herbert Hoover; Robert LaFollette, Jr., former Senator from Wisconsin; Warren Austin, former Senator from Vermont, now U. S. Chief Delegate to the UN General Assembly; Owen Brewster, Senator from Maine; Dwight Green, Governor of Illinois; John Dulles; Clare Luce; J. Edgar Hoover, Director of the Federal Bureau of Investigation and James Duff, Governor of Pennsylvania.

All of these choices were obtained without the use of a list or suggestions of any kind. About one in every five persons (21 pct) had no opinion at this time. This compares with 37 pct who gave no opinion in a similar survey at a comparable time before the 1944 convention.

It should be emphasized that a candidate's chances of winning the nomination are not necessarily improved by popularity at this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time, more than a year away from nominating convention time.

It is entirely possible that some man not even mentioned among today's choices will be picked as the nominee when the GOP convention is actually held. In that connection there is the example of Wendell Willkie who zoomed across the political horizon to win the GOP nomination in 1940.

Moreover, the list of choices will undoubtedly change with the course of events and with the degree to which the various possible candidates become better known between now and convention time.

The London Economist

(CONTINUED FROM PAGE 113)

view, that is a mistaken conclusion. A coalition is, in any case, a political impossibility in present circumstances. But even if it were possible, it would still be mistaken, since a coalition Cabinet is by definition the father of compromises and the enemy of strong consistent policies.

The Economist does not join with those who would bring the Tories into a coalition; nor does it joint with those who would turn the Labor Party out and put the Conservatives in. For better or worse, the country must work out its salvation with a Labor Government.

But that does not mean that no change of front is to be asked of the government. Indeed, they must be asked to face about, to change their attitude and to acquire a fresh policy. They cannot hope to lead the nation if they persist in regarding themselves as the avenging angels of the dispossessed.

If they are to secure the cooperation of both halves of the nation, they should abandon the pose that they have a monopoly both of political righteousness and of economic know-how. If they are to call for efforts and sacrifices from the whole people, they must make some sacrifice of their own pride and prejudice.

No one would ask them, if they are to stay in office, to abandon their whole program; but they should be prepared to defer those measures, such as the Transport Bill and the nationalization of the iron and steel industry, for which there is no support at all outside their own ranks. No one would ask them to let the opposition pick the Cabinet, but ministers who widen the divisions in the nation with every speech they make, such as Mr. Shinwell and Mr. Dalton, should either be muzzled or removed.

If they were to do these things they could fairly ask from all sections of the nation a similar willingness to judge every policy not by asking whose interests are affected but by applying the supreme pragmatic test of whether it will work. They would have recaptured the moral eminence from which they could give the people a positive inspiration.

If Mr. Attlee and his colleagues were to swallow their party pride enough to make this approach to the nation, they could be sure of the response. If the people who now so suddenly walk again in darkness could see the great light of a united purpose, they would once again show themselves the masters of their perils.

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French Ball Bearing Industry Expanding

Paris

• • • **The French ball bearing** industry is proceeding with its reconstruction, and hopes to increase the tonnage available on the domestic market by 50 pct this year, according to the French weekly, *Usine Nouvelle.* Supplies of bearing steel, and damage wrought by Allied bombers during the war, have been the controlling factors on production during the past year.

Reconstruction of the Annecy works in Savoy is in progress, and present production is estimated at approximately 15 pct to 20 pct of prewar. The firm is now known as Societe Anneceenes de Roulements, and is controlled by the nationalized Renault automobile works in Paris. The bearing work of the Renault firm, which was carried on prewar at a works at St. Michel de Maurienne, will be transferred to the Savoy works. When this transfer is completed the works will have a capacity of 6 million bearings per year.

Engineering Foundation Seeks Additional Funds

New York

• • • **A bid for additional** funds for productive research in the field of engineering has been made by Dr. A. B. Kinzel, chairman, Engineering Foundation, 29 W. 39th St., New York.

The Foundation has been engaged in research activities for more than 30 years. It was created by the American Society of Civil Engineers, American Institute of Mining & Metallurgical Engineers, The American Society of Mechanical Engineers, and American Institute of Electrical Engineers.

The foundation assists in originating, organizing, and financing projects in many fields of engineering, preference being given to projects of a fundamental nature not competing with research in the laboratories of various industries. The foundation supplements research activities carried on at universities, by engineering and scientific societies and by industrial laboratories.

The foundation aided in establishing the National Research Council and its Division of Engineering and Industrial Research. It has contributed to the support of the Engineers' Council for Professional Development, which, representing some eight engineering organizations, aims at the advancement of the profession of engineering. The foundation has supported engineering research and investigations in such fields as: Arch dams for power development; soil mechanics and foundations; arch and column design; hydraulic research; thermal properties of steam; welding; stability of steels as affected by temperature; plastic flow of metals; alloys of iron; metal cutting; cotton seed processing; dielectrics and power cable insulation, and many other fields.

The foundation is a department of the United Engineering Trustees, Inc., a non-profit organization exempt from federal income tax. Contributions made to the United Engineering Trustees, Inc., for the Engineering Foundation Fund, are deductible for federal income tax purposes to the extent provided by the act.

The above illustration shows a No. 200 Siefen Spray Outfit which includes the spray gun designed for spraying buffing compounds, mounting post, quart cup, two six-foot lengths of air hose and a simple strong foot operating valve. All that is required is regulated air pressure to the hose which leads to the foot valve. Simple in design, simple to install, simple to use.

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BUFFING NU-SPRA-GLU is a LIQUID GREASE and ABRASIVE mixture that can be sprayed to a revolving wheel. On the market only a year and a half, BUFFING NU-SPRA-GLU has been used successfully to replace bar compounds. It gives dividends four ways: it imparts a mirror finish to the metal; it saves 70% of the compound; it gives a 30% saving of buffs; it eliminates injury to buffers.

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**Patent on method has been applied for.*

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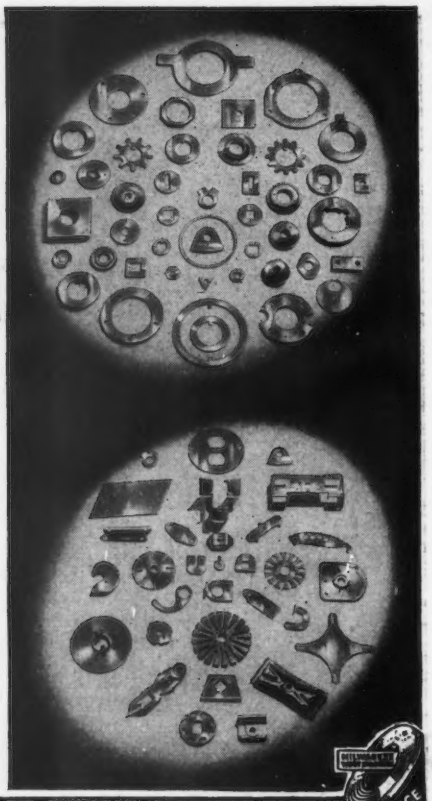

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Sponsors Study Program

Pittsburgh

• • • A 3-year study of farm building devices, equipment and construction units has been started by the Illinois Agricultural Experimental station at the University of Illinois College of Agriculture under the sponsorship of the Aluminum Co. of America.

Funds contributed by Alcoa will support the program designed not only to determine new uses for aluminum products but also to make certain that aluminum is used only where it is economical and practical for the farmer. Farm needs and requirements will be studied and new designs created and tested under the company-university program.

The research will be conducted by the Dept. of Agricultural Engineering as a phase of its farm structures and rural housing program, and the study will be directed by Deane G. Carter, professor of farm structures.

ASTE Preview

(CONCLUDED FROM PAGE 59)

Chief Tool Eng., Reed Roller Bit Co., Houston.

Dean Saurenman, Chief Tool Eng., Baker Oil Tool Co., Houston.

Speakers: *The Manufacture and Use of Geophysical Instruments* by J. H. Dunaway, Sr. Research Geophysicist, Humble Oil & Refining Co., Houston.

Precision Instruments Used in Oil Well Surveying by I. K. Fussell, Prod. Eng., Schlumberger Well Surveying Corp., Houston.

2:00 P. M.

Subject: Principles of Design for Carbides, and Unusual Applications

Chairman: H. E. Linsley, Machine Tool Editor, THE IRON AGE, New York City.

Speakers: Philip McKenna, pres., and W. L. Kennicott, chief eng., Kennametal, Inc., Latrobe, Pa.

8:30 P. M.

Subject: Business and the Manufacture of Special Valves and Meters

Chairman: R. W. Ford, sales eng., Ex-Cell-O Corp., Pittsburgh.

Speaker: Col. Willard F. Rockwell, pres., Rockwell Manufacturing Co., Pittsburgh, Pa.